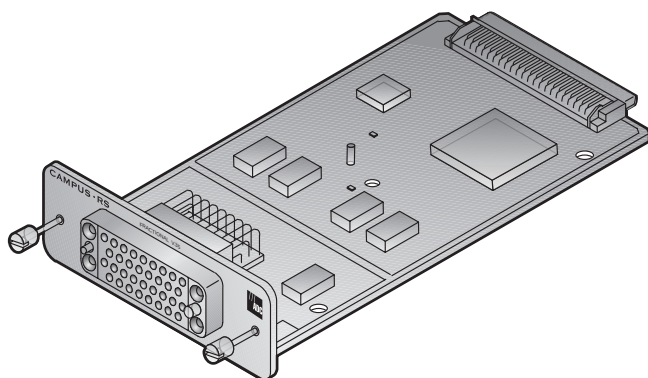


USER MANUAL



CAMPUS-RS FRACTIONAL INTERFACE CARD

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July, 2002

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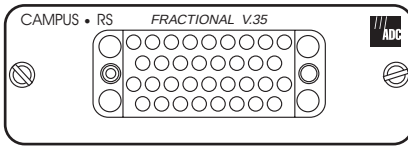
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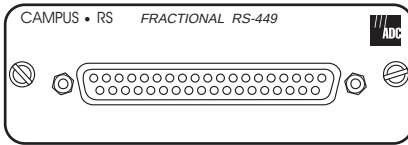
USING THIS MANUAL

This manual documents the following versions of the ADC® Campus-HRS™ Fractional Interface Card:

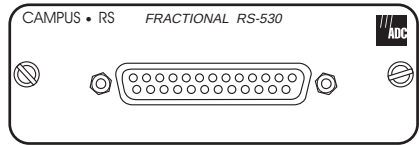
Part Number	Interface
150-1177-51	V.35
150-1178-52	RS-449
150-1178-53	RS-530
150-1178-54	RS-530A
150-1178-55	X.21



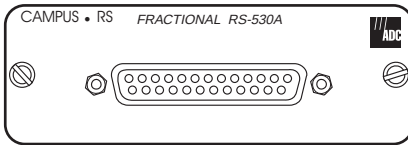
Fractional V.35



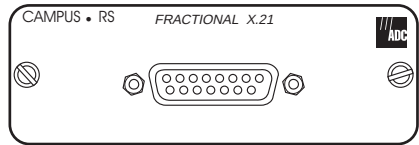
Fractional RS-449



Fractional RS-530



Fractional RS-530A



Fractional X.21

This manual provides the following information on the Campus-HRS™ Fractional Interface Card:

- How to install Campus-HRS™ Fractional Interface Card in either a Campus-RS Desktop Unit (150-1158-01, 150-1158-02, 150-1158-51, or 150-1158-52) or Campus-Star® chassis (150-1220-01, 150-1220-02, or 150-1220-51)
- How to use the Campus-HRS™ Fractional Interface Card to configure and monitor a campus system
- How to contact ADC for assistance

DOCUMENT CONVENTIONS

Two types of messages, identified by icons, appear in the text.



Notes contain information about special circumstances.



Cautions indicate the possibility of equipment damage or the possibility of personal injury.

This manual uses the following conventions:

- **This font** indicates text that appears on the LCD or terminal.
- Keycaps, such as **ENTER**, indicate keys that you press on the terminal keyboard.
- Key names in **bold font** indicate buttons on the desktop unit or line unit that you press.

For a list of abbreviations used in this manual, see [“Abbreviations” on page B-1](#).

UNPACK AND INSPECT THE SHIPMENT

Upon receipt of the shipment:

- 1 Unpack the card and inspect it for signs of damage. If it has been damaged in transit, immediately report the extent of the damage to the transportation company and to ADC Technologies . Order replacement equipment if necessary.
- 2 Compare the contents of the package against the packing list to ensure a complete and accurate shipment. If the shipment is incomplete or incorrect, contact ADC Technologies as described in “[Certification and Warranty](#)” on the inside back cover. To contact ADC see “[Product Support](#)” on page D-1.

If you need to store the unit for several days or more before installing it, return it to the original packaging.

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ABOUT THE PRODUCT

1

The ADC Campus-RS[™] (Rate-Selectable) Fractional Interface Card provides a connection between a High-bit-rate Digital Subscriber Line (HDSL) and a network or other digital equipment. It installs into either a:

- Campus-Star chassis, along with a Campus-RS Line Unit
- Campus-RS Desktop Unit

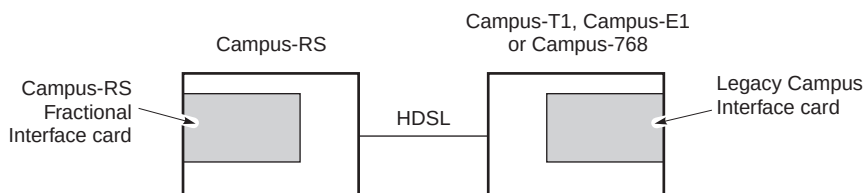
This equipment comprises half of a High-bit-rate Digital Subscriber Line (HDSL) transmission system. When connected to another Campus-RS, Campus-T1[®], Campus-768[®], or Campus-E1[®] Desktop Unit or Line Unit, the Campus-RS system can transport digitized voice, data, and video signals over existing copper wire at a number of different HDSL rates.

The Campus-RS Fractional Interface Card converts incoming data, control signals, and timing information into its internal format. The desktop unit or line unit then converts this format to a Two Bit, One Quaternary (2B1Q) HDSL line format for high-speed transmission over a local telephone-grade copper network.

COMPATIBILITY WITH EARLIER CAMPUS PRODUCTS

Campus-RS Fractional Interface Card Compatibility

When mated with a Campus-RS Desktop Unit or Campus-RS Line Unit (see [“Campus-RS Desktop and Line Unit Compatibility”](#)), the Campus-RS Fractional Interface Card is compatible, over the HDSL link, with earlier versions of Campus products, such as the Campus-T1, Campus-E1, and Campus-768, as shown in the following illustration.



All earlier versions of Campus products are manufactured to operate at a single HDSL transmission rate, while the Campus-RS transmission rate is user-selectable. To support compatibility with the application shown above, the following configuration options must be set on the Campus-RS Fractional Interface Card:

- Set the HDSL Operating Mode to Standard Mode
- Set the Standard Mode HDSL Rate to T1, E1, or 768, to match the rate of the earlier product.

For information on setting these options, see [“Set the HDSL Operating Mode”](#) on page 3-2.

Campus-RS Desktop and Line Unit Compatibility

Campus-RS Desktop and Line Units are fully compatible with most of the earlier versions of Campus products, including Campus-E1[®], Campus-T1[®], and Campus-768[™]. The Campus-RS Desktop and Campus-RS Line Units are not currently compatible with Campus-384[®] products.

Furthermore, if a Campus-RS unit is connected over an HDSL link to an earlier Campus product, and if either unit has the HDSL Transceiver (XCVR) Mode set to AUTO, the HDSL link may not operate properly.

When operating the Campus-RS product with an earlier version of the Campus products, to avoid any problems with link startup or operation, it is recommended that the Transceiver Mode be set as follows:

- Campus-RS = **MASTER**
- Campus E1/T1/768 = **SLAVE**

If one or both units are already set to AUTO and the HDSL link is active, disconnect the HDSL link, change the settings as recommended, and reconnect the link. This will assure the link integrity on any subsequent startups.



This situation does not apply to a circuit with two Campus-RS units. You may leave the units set to their default setting of AUTO, and they will operate properly.

Channel Reversal

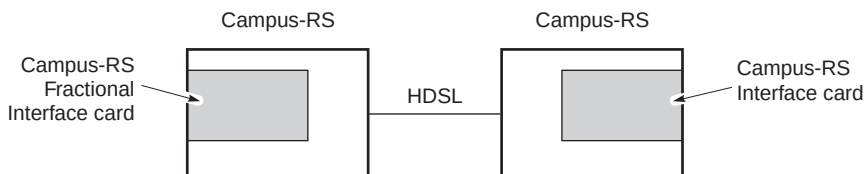
The current release of Campus-RS does not recognize HDSL loop reversal. That is, the cable pairs must be “straight through,” with Loop A connected to pins 1 and 2 of the Line Connector on both ends of the loop, and Loop B connected to pins 4 and 5.

A possible symptom of loop reversal is to observe the LCD Margin on an RS unit display during startup. The loop display will alternate between “ACK” and “SIG” as expected. Then, one loop may display margin values as if the link is synchronizing, but after 1 to 2 seconds will drop back to startup.

A future firmware release will allow automatic detection and compensation for loop reversal.

COMPATIBILITY WITH CAMPUS-RS PRODUCTS

The Campus-RS Fractional Interface Card is also compatible, over the HDSL link, with another Campus-RS unit, as shown in the following illustration.



When connecting to another Campus-RS Desktop Unit or Line Unit, Standard Mode is still supported, providing access to HDSL transmission rates of T1, E1, and 768 kbps. In addition, the Campus-RS system can be configured to support an extended set of HDSL transmission rates, over either one or two HDSL loops.



Not all modes and rates may be available. Some Campus-RS interface cards support only a limited set of operating modes and transmission rates. Refer to the remote interface card user manual to see the HDSL modes and rates supported by the card.

To support these additional transmission rates, set the following options on the Fractional Interface Card:

- Set the HDSL Operating Mode to Extended Mode.
- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loops, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to the desired setting. The range of rates available for the HDSL Rate depends on the setting of the Extended Mode Loop Configuration:
 - 1 Loop HDSL Rate settings are between 64 kbps and 2.304 Mbps, in 64 kbps increments
 - 2 Loop HDSL Rate settings are between 256 kbps and 4.608 Mbps, in 128 kbps increments



For the 2 Loop HDSL configuration, specific revisions of the Fractional Interface Cards only support a top rate of 2.304 Mbps configuration. Contact ADC for additional information regarding the affected part numbers.

For information on setting these options, see [“Set the HDSL Operating Mode” on page 3-2](#).

INSTALLING THE CAMPUS-RS FRACTIONAL CARD 2

You can mate the Fractional Interface Card with either a Campus-RS Desktop Unit or a Campus-RS Line Unit.

The following sections describe how to install the card.



Make sure you install the card into a Campus-RS Desktop Unit or into a Campus-Star chassis with a Campus-RS Line Unit. The Campus-RS Fractional Interface Card will not operate if it is installed in an earlier version of these Campus products.

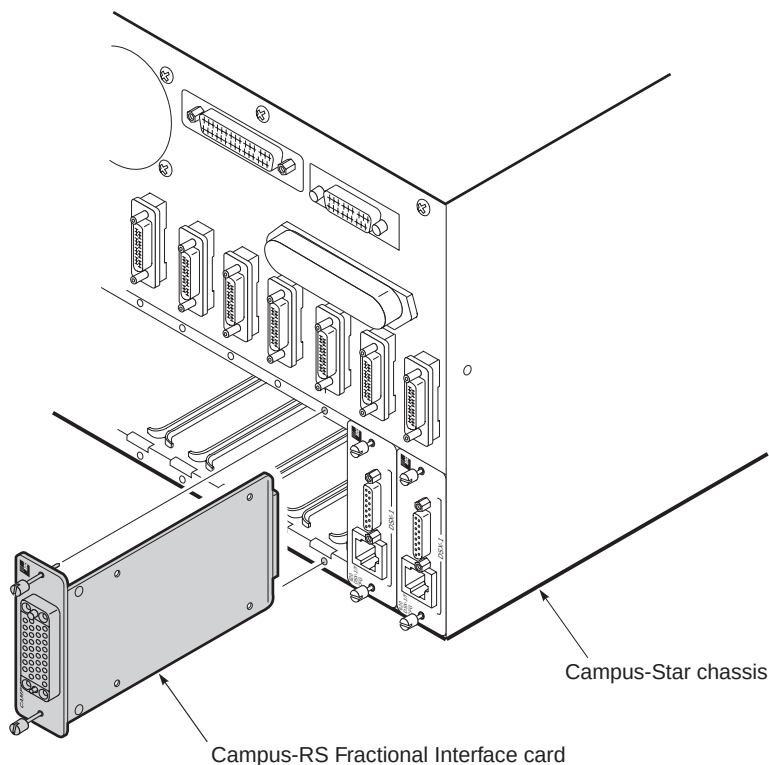
INSTALLING THE CARD IN A CAMPUS-STAR CHASSIS



Before installing the interface card, make sure there is not a line unit installed in the corresponding slot on the front of the Campus-Star chassis. The interface card is not hot-swappable. Installing the card with a corresponding line unit installed may cause damage to the card, the line unit, or both.

To install the Fractional Interface Card into a Campus-Star chassis:

- 1 Slide the card into the guide rails in the desired slot on the rear of the Campus-Star chassis.



- 2 Gently press the card into place until it is seated firmly in the rear connector.
- 3 Use the two screws on the card to secure it into place.
- 4 Install a Campus-RS Line Unit to work with the interface card, according to the instructions in the *Campus-RS Line Unit User Manual*.
- 5 Use a data cable to connect the data port to your host equipment. See [“Pinouts” on page A-3](#) for a listing of each type of data port.

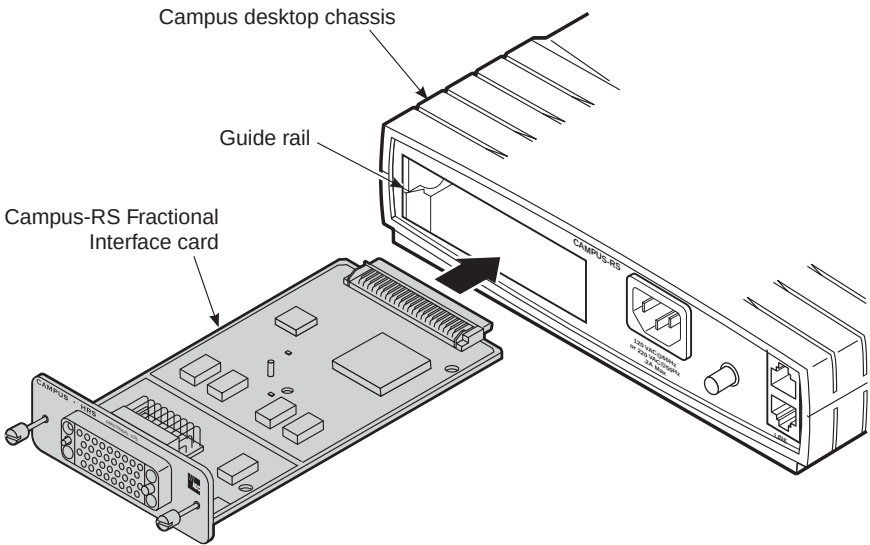
INSTALLING THE CARD IN A CAMPUS-RS DESKTOP UNIT



Turn off the power to the desktop unit before you install the card. Installing the card with the power on may cause damage to the desktop unit, the card, or both.

To install the Fractional Interface Card into a Campus-RS Desktop Unit chassis:

- 1 Slide the card into the guide rails in the rear of the desktop unit.



- 2 Gently press the card in until it is seated firmly in the rear connector.
- 3 Use the two screws on the card to secure it into place.
- 4 Use a data cable to connect the data port to your host equipment. See [“Pinouts” on page A-3](#) for a listing of each type of data port.
- 5 Connect the desktop unit to an HDSL line, according to the instructions in the *Campus-RS Desktop Unit User Manual*.

SETTING UP THE CAMPUS-RS SYSTEM

3

There are three sets of configuration options that must be set for the Campus-RS Fractional Interface Card to operate:

- the HDSL mode and rate
- the Timing Source
- The Transmit Clock

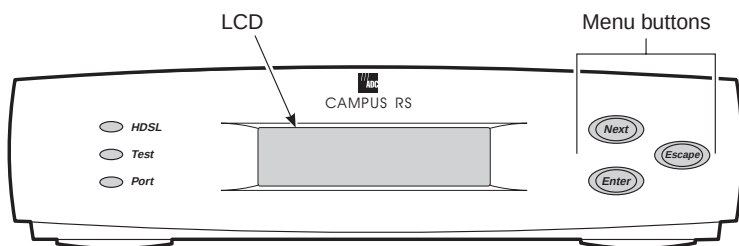
Depending on the requirements of your network, you may be able to use the default settings for one or more of these options. If so, you can skip the relevant section(s). With the default settings, the Fractional Interface Card is set to operate:

- with the HDSL Operating Mode set to Standard Mode
- with the Standard Mode HDSL Rate set to T1 over two loops
- with the Timing Source option set to Internal
- with the Transmit Clock option set to External, so the SD signal is sampled based on TT input

See [“Default Settings” on page A-2](#) for a list of all configuration option default settings.

The steps in this chapter set these options through the menu buttons and LCD on the front of the desktop unit or the Campus-Star Campus Management Unit (CMU). You may also use an ASCII terminal to set these options, as described in [Chapter 5, “Configuring with an ASCII Terminal.”](#)

The figure below shows the LCD and menu buttons on the Campus-RS Desktop Unit. See the *Campus-Star User Manual* for the location of the LCD and menu buttons on the CMU.



SET THE HDSL OPERATING MODE

The Fractional Interface Card is set to operate in Standard Mode with a T1 (1.544 Mbps) HDSL Rate. This is compatible with other Campus-RS products and with Campus-T1 Desktop Units and Line Units. If this is the desired setting for your system, proceed to [“Set the Primary Timing Source” on page 3-5](#). Otherwise, follow the steps in this section to adjust the HDSL transmission rate.

You can also use an ASCII terminal to set the HDSL Operating Mode. For instructions, see [“Setting the HDSL Operating Mode” on page 5-9](#).

To set the HDSL Operating Mode:

- 1 Press **Escape** until Campus I/F Card: FRAC displays.
- 2 Press **Next** until HDSL LINK CONFIG & STATUS displays, then press **Enter**. OPERATING MODE displays.
- 3 Continue with [“Selecting a Standard HDSL Rate”](#) or [“Selecting Extended Mode Parameters,”](#) depending on the HDSL mode you want to set.

Selecting a Standard HDSL Rate

This section continues from [Step 3](#) in the previous section to set a Standard Mode HDSL Rate.

Choose from the following settings:

- T1
- E1
- 768

To set the Standard Mode HDSL Rate:

- 1** If the Operating Mode is set to Standard Mode, proceed to [Step 3](#). Otherwise, press **Enter**.
- 2** Press **Next** until the LCD displays STANDARD, then press **Enter**. The Operating Mode changes to Standard Mode.
- 3** Press **Next** until HDSL RATE displays, then press **Enter**.
- 4** Press **Next** until the desired HDSL transmission rate displays, then press **Enter**.

To continue setting up the system, proceed to “[Set the Primary Timing Source](#)” on page 3-5.

Selecting Extended Mode Parameters

This section continues from [Step 3 on page 3-2](#) to set the Extended Mode parameters.

To set a Standard Mode HDSL Rate, you choose from the list of predefined rates. To set an Extended Mode HDSL Rate, you must:

- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loop, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to one of the options determined by the Extended Mode Loop Configuration:
 - 1 Loop HDSL Rate settings are between 64 kbps and 2.304 Mbps, in 64 kbps increments
 - 2 Loop HDSL Rate settings are between 256 kbps and 4.608 Mbps, in 128 kbps increments



For the 2 Loop HDSL configuration, specific revisions of the Fractional Interface Cards only support a top rate of 2.304 Mbps configuration. Contact ADC for additional information regarding the affected part numbers.

- 1 With the LCD displaying **OPERATING MODE**, press **Enter**.
- 2 Press **Next** until **EXTENDED** displays, then press **Enter**. **OPERATING MODE** displays.
- 3 Press **Next** until **LOOP MODE** displays.
- 4 Press **Enter**.
- 5 Press **Next** until the desired Loop Mode setting displays, then press **Enter**. **LOOP MODE** displays.
- 6 Press **Next**. **HDSL RATE** displays.
- 7 Press **Enter**.
- 8 Press **Next** until the desired HDSL transmission rate displays, then press **Enter**.

To continue setting up the system, proceed to [“Set the Primary Timing Source” on page 3-5](#).

SET THE PRIMARY TIMING SOURCE

The primary timing source determines the timing for the entire HDSL system. Timing can come from one of three parts of the Campus system:

- Data Port receives timing through the host equipment connected to the data port.
- Internal receives timing from the internal oscillator of the Campus unit (default setting).
- HDSL receives timing over the HDSL line.

Either the local or remote unit must have the timing source set to HDSL. The other unit must be set to Data Port or Internal, depending on the system setup. See [“Timing Source” on page 8-1](#) for examples of timing configurations.

To set the Primary Timing Source:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until **TIMING SOURCE** displays, then press **Enter**. The current timing source setting displays.
- 4 Press **Next** until the desired setting displays, then press **Enter**. **TIMING SOURCE** and the new setting display.
- 5 If you set the Timing Source option to Internal or HDSL, continue with the [“Set the Transmit Clock”](#) section. If the Timing Source is set to Data Port, no further configuration is necessary.

SET THE TRANSMIT CLOCK

The Transmit Clock option determines how the SD signal is sampled if the Timing Source is set to Internal or HDSL. There are two settings:

- External: SD is sampled based on the clock transitions on the TT input.
- Internal: SD is sampled based on the clock transitions on the SCT output.

For complete information about the Transmit Clock option, see [“Transmit Clock” on page 8-4](#).

To set the Transmit Clock:

- 1 Press **Escape** until CAMPUS RS I/F: FRAC displays.
- 2 Press **Next** until DATA PORT CONFIG & STATUS displays, then press **Enter**. RATE MULTIPLIER displays.
- 3 Press **Next** until TRANSMIT CLOCK displays, then press **Enter**. The current clock setting displays.
- 4 Press **Next** until the desired setting displays, then press **Enter**. TRANSMIT CLOCK and the new setting display.

CONFIGURING AND MONITORING THROUGH THE LCD

4

You can configure the Campus-RS Fractional Interface Card and view system information using the LCD and menu buttons located on the front of the Campus-RS Desktop Unit or a CMU installed in the Campus-Star chassis.

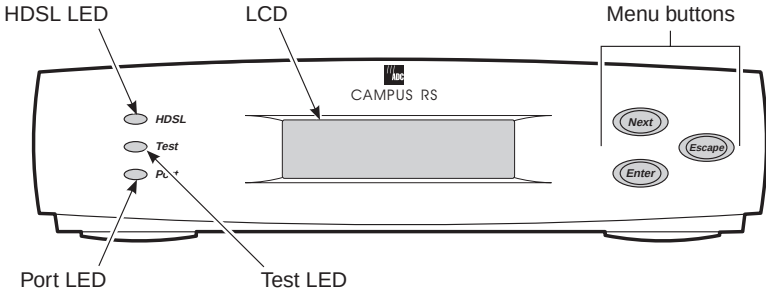
This chapter describes how to use the LCD to set the individual configuration options.

For Information About:	See Page
Navigating the LCD Menus	4-2
Restoring the System to Default Values	4-4
Setting the Data Rate	4-4
Inverting the Transmit Clock	4-10
Inverting Data Signals	4-11
Configuring Output Control Signals	4-12
Configuring as a Master or Slave Unit	4-14
Viewing and Configuring Alarms	4-15
Configuring Loopbacks	4-20
Viewing System Information	4-22

You can also perform these functions through an ASCII terminal connected to the Campus-RS Desktop Unit or a Campus-RS Line Unit installed in the Campus-Star. To use an ASCII terminal to configure the system, see [Chapter 5, “Configuring with an ASCII Terminal.”](#) To view system and status information, see [Chapter 6, “View Information and Status.”](#)

NAVIGATING THE LCD MENUS

Use the LCD and menu buttons on the desktop unit or CMU to navigate the menus and configure the Campus-RS system. The illustration below shows the LCD and menu buttons on the desktop unit. See the Campus-Star User Manual for the location of the LCD and menu buttons on the CMU.



The following table describes how to use the menu buttons to move through the menus and select items.

Button	Function
Next	Scrolls to the next LCD menu or option at the same level of the menu structure.
Enter	Selects the displayed LCD menu or option.
Escape	Returns to the previous LCD menu selection.

Instructions for selecting individual configuration options are included with each option. The basic procedure is:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until the desired menu name displays.
- 3 Press **Enter** to access the menu options.
- 4 Press **Next** until the desired option name displays.
- 5 Press **Enter** to access the settings for the option.
- 6 Press **Next** until the desired setting displays.
- 7 Press **Enter** to select and save the desired option.

The instructions for each procedure end with the LCD somewhere in the middle of the menu structure. You may leave the LCD set to its display at this point or return it to any other display.

See “[LCD Menu Reference](#)” on page A-12 for a map of the LCD menu structure.

RESTORING THE SYSTEM TO DEFAULT VALUES

To return the Campus unit configuration options to their default values:

- 1 Press **Escape** until CAMPUS RS I/F: FRAC displays.
- 2 Press **Enter**. The LCD displays the software version number.
- 3 Press **Next** until the LCD displays Press ENTER to factory reset, then press **Enter**.

The system configuration options return to the default values listed in “Default Settings” on page A-2.



Some options, such as the HDSL Rate must be the same for both the local and remote unit. Resetting the Campus unit configuration values on one unit only, may cause the HDSL link to go down.

SETTING THE DATA RATE

The HDSL Mode setting determines the data rate. Depending on the mode you want to set, continue with either “Standard Mode Data Rates” or “Extended Mode Data Rates.”

Standard Mode Data Rates

In Standard HDSL Mode, the HDSL line always operates at a constant rate, however the Fractional Interface Card can be set to operate synchronously at integer multiples of either 56 kbps or 64 kbps ($n \times 56$ kbps or $n \times 64$ kbps). In addition, the Fractional Interface Card can also be configured to operate at “full rate,” where all the user bandwidth of the HDSL line is made available to the data port.

The range of the integer n depends upon the Standard Mode Rate, as shown in the following table.

n	Standard Mode – T1		Standard Mode – 768		Standard Mode – E1
	56K Rate Multiplier (n x 56k)	64K Rate Multiplier (n x 64k)	56K Rate Multiplier (n x 56k)	64K Rate Multiplier (n x 64k)	(Rate Multiplier is N/A)
1	56	64	56	64	
2	112	128	112	128	
3	168	192	168	192	
4	224	256	224	256	
5	280	320	280	320	
6	336	384	336	384	
7	392	448	392	448	
8	448	512	448	512	
9	504	576	504	576	
10	560	640	560	640	
11	616	704	616	704	
12	672	768	672	768	
13	728	832			
14	784	896			
15	840	960			
16	896	1024			
17	952	1088			
18	1008	1152			
19	1064	1216			
20	1120	1280			
21	1176	1344			
22	1232	1408			
23	1288	1472			
24	1344	1536			
Full Rate		1544		776	2048

There are three steps to setting the data rate:

- setting the HDSL Standard Mode Rate, as described in [“Selecting a Standard HDSL Rate” on page 3-3](#)
- setting the rate multiplier
- choosing from the list of available data rates, determined by the rate multiplier and the HDSL Rate

Set the Rate Multiplier

The Rate Multiplier determines the size of each data packet that is transmitted or received through the data port. It can be set to one of the following:

- 64 KBPS
- 56 KBPS

To set the Rate Multiplier:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Enter**. The LCD displays the current rate multiplier.
- 4 Press **Next** until the desired option displays, then press **Enter**. **RATE MULTIPLIER** along with the new setting display.



If you change the Rate Multiplier, the Data Port Rate changes automatically to reflect the new multiplier.

Choose the Data Rate

To set the Data Rate:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until **DATA PORT RATE** displays, then press **Enter**.
- 4 Press **Next** until the desired option displays, then press **Enter**.
DATA PORT RATE along with the new setting display.

Extended Mode Data Rates

In Extended HDSL Mode, the data port of the Fractional Interface Card is determined by the HDSL rate. That is, the data port rate can be changed only by changing the HDSL Rate. However, for each HDSL rate, the data port Rate Multiplier can be set to accommodate $n \times 56$ kbps or $n \times 64$ kbps operation, as shown in the following table.

Data port rates available according to Rate Multiplier selection			Data port rates available according to Rate Multiplier selection		
HDSL Rates for 1 Loop	56K Rate Multiplier	64K Rate Multiplier	HDSL Rates for 2 Loops	56K Rate Multiplier	64K Rate Multiplier
64	56	64			
128	112	128	256	224	256
192	168	192	384	336	384
256	224	256	512	448	512
320	280	320	640	560	640
384	336	384	768	672	768
448	392	448	896	784	896
512	448	512	1024	896	1024
576	504	576	1152	1008	1152
640	560	640	1280	1120	1280
704	616	704	1408	1232	1408
768	672	768	1536	1344	1536
832	728	832	1664	1456	1664
896	784	896	1792	1568	1792
960	840	960	1920	1680	1920
1024	896	1024	2048	1792	2048
1088	952	1088	2176	1904	2176
1152	1008	1152	2304	2016	2304
1216	1064	1216	2432	2128	2432
1280	1120	1280	2560	2240	2560
1344	1176	1344	2688	2352	2688
1408	1232	1408	2816	2464	2816
1472	1288	1472	2944	2576	2944
1536	1344	1536	3072	2688	3072
1600	1400	1600	3200	2800	3200
1664	1456	1664	3328	2912	3328
1728	1512	1728	3456	3025	3456
1792	1568	1792	3584	3136	3584

Data port rates available according to Rate Multiplier selection			Data port rates available according to Rate Multiplier selection		
HDSL Rates for 1 Loop	56K Rate Multiplier	64K Rate Multiplier	HDSL Rates for 2 Loops	56K Rate Multiplier	64K Rate Multiplier
1856	1624	1856	3712	3248	3712
1920	1680	1920	3840	3360	3840
1984	1736	1984	3968	3472	3968
2048	1792	2048	4096	3584	4096
2112	1848	2112	4224	3696	4224
2176	1904	2176	4352	3808	4352
2240	1960	2240	4480	3920	4480
2304	2016	2304	4608	4032	4608

There are two steps to setting the data rate:

- setting the Extended Mode Loop Configuration and HDSL Rate, as described in [“Selecting Extended Mode Parameters” on page 3-4](#)
- setting the rate multiplier

Set the Rate Multiplier

The Rate Multiplier determines the size of each data packet that is transmitted or received through the data port. It can be set to one of the following:

- 64 KBPS
- 56 KBPS

To set the Rate Multiplier:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Enter**. The current rate multiplier displays.
- 4 Press **Next** until the desired option displays, then press **Enter**. **RATE MULTIPLIER** along with the new setting display.



If you change the Rate Multiplier, the Data Port Rate changes automatically to reflect the new multiplier.

INVERTING THE TRANSMIT CLOCK

There may be circumstances in which it is either desirable or necessary to invert one or more of the TT, SCT, and SCR clocks. This could be true if the host equipment provides inverted clock signals, if the differential clock signals are switched in the data cable, or if there is excessive clock delay. The Fractional Interface Card allows you to invert any of these clock signals by changing the appropriate Invert Clock option.

For physical-layer protocols which have unbalanced (single-ended) clock signals, the Invert Clock option has the effect of simply inverting the clock signal. This appears as a 180° phase delay. For physical-layer protocols which have balanced (two-wire) clock signals, the Invert Clock option has the effect of switching the inverting and non-inverting contacts.

There are two settings for each Invert Clock option:

- OFF leaves the output clock in its normal, non-inverted, state.
- ON inverts the clock signal or, for the TT input, inverts the input signal internally.

To invert a transmit clock:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until the appropriate invert clock option displays:
 - **INVERT INPUT CK** to invert the TT signal
 - **INVERT OUTPUT TX CK** to invert the SCT clock
 - **INVERT OUTPUT RX CK** to invert the SCR clock

- 4 Press **Enter**. The current invert clock setting displays.
- 5 Press **Next** until the desired setting displays, then press **Enter**. The invert clock option along with the new setting displays.

INVERTING DATA SIGNALS

The Fractional Interface Card allows you to invert the SD and RD signals. Some protocols, such as X.25, use this data inversion to satisfy the ones density requirement of T1 lines operating in AMI mode. Unless specifically required by a protocol, do not use data inversion.

There are two settings for the Data Inversion option:

- OFF leaves SD and RD signals in their normal, non-inverted, state.
- ON inverts the SD and RD signals.

To invert the SD and RD signals:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until **INVERT DATA** displays, then press **Enter**. The current invert data setting displays.
- 4 Press **Next** until the desired setting displays, then press **Enter**. **INVERT DATA** along with the new setting display.

CONFIGURING OUTPUT CONTROL SIGNALS

The fractional interface cards provide four standard output control signals:

- RLSD (Receive Line Signal Detect)
- TM (Test Mode)
- DSR (Data Set Ready)
- CTS (Clear to Send)

The operation of each control signal depends upon the specific operating mode selected. Each control signal can be individually configured for one of three modes:

- ON forces the control signal to remain on permanently, regardless of any other control signal activity or changes in unit status.
- OFF forces the control signal to remain off permanently, regardless of any other control signal activity or changes in unit status.
- STD sets to signal according to the standard rules for control signal operation found in RS-449 and RS-530 interfaces, as described below:
 - RLSD is on as long as the HDSL link is synchronized. If the HDSL link is not synchronized, then RLSD is off.
 - TM is on whenever a loopback function is active at either the local or remote unit. The TM signal is affected by both V.54 loopbacks and loopbacks that are initiated through the LCD or terminal menus.

- DSR follows the state of the Data Terminal Ready (DTR) input signal. When the DTR input is turned on, the DSR output is turned on. When the DTR input is turned off, the DSR output is turned off. This type of operation is consistent with standard operation for non-switched communications equipment operating on a dedicated private channel, such as HDSL.
- CTS follows the state of the Request to Send (RTS) input signal. When the RTS input is turned on, the CTS output is turned on. When the RTS input is turned off, the CTS output is turned off. This type of operation is consistent with standard operation for non-switched communications equipment operating on a dedicated private channel, such as HDSL.

To configure the control signal options to the desired settings:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until **CONFIGURE OUTPUT CONTROL SIGNALS** displays, then press **Enter**. The current output control signal settings, with the CTS setting flashing, display.
- 4 Press **Next** until the signal you want to change is flashing.
- 5 Press **Enter** until the desired setting displays, then press **Next**.
- 6 Do one of the following:
 - Press **Next** to select another output control signal, or
 - Press **Escape** to exit.

CONFIGURING AS A MASTER OR SLAVE UNIT

The Transceiver Mode option determines the hierarchy of the two Campus units when attempting to establish an HDSL link. There are three settings:

- If a unit is set to Master, it initiates the HDSL link. The other Campus unit must be set to Slave or Auto.
- If a unit is set to Slave, it waits for the other Campus unit to initiate the HDSL link. The other unit must be set to Master or Auto.
- If a unit is set to Auto, it automatically switches between Master and Slave until an HDSL link is established. The setting of the other Campus unit is irrelevant. This is the default setting.



Unless you have a compelling reason for doing otherwise, ADC recommends leaving the Transceiver Mode option set to Auto.

To change the Transceiver Mode:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **HDSL LINK CONFIG & STATUS** displays, then press **Enter**. **OPERATING MODE** displays.
- 3 Press **Next**. **XCVR MODE** displays, then press **Enter**.
- 4 Press **Next** to scroll through the Transceiver Mode options until the desired setting displays.
- 5 Press **Enter** to select the displayed setting. **XCVR MODE** and the new setting display.

VIEWING AND CONFIGURING ALARMS

To determine if there is an active alarm condition:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **ALARM CONFIG & STATUS** displays, then press **Enter**. The current alarm status displays.

There are three indicators that can appear under **CURRENT ALARMS**:

- **HDSL** indicates an HDSL alarm
- **LOC** indicates a local alarm
- **REM** indicates a remote alarm

If a specific indicator does not display, there is no alarm in that area of the system.

The following sections describe how to view specific alarm information for the HDSL, local, and remote ports, and how to configure thresholds for the various alarms.

HDSL Alarms

This section describes how to view and configure alarms on the HDSL line.

Viewing Current Alarms

If the **CURRENT ALARMS** display indicates an HDSL alarm, you can determine the alarm type:

- 1 From the **CURRENT ALARMS** display, press **Next**. **HDSL LINK ALARMS** displays.
- 2 Press **Enter**. The current status of three alarms displays:
 - **LINK** shows whether the HDSL link is on or off.
 - **ES** shows whether the errored seconds threshold has been exceeded on the local unit, remote unit, or both.
 - **MARGIN** shows whether the margin threshold has been exceeded on the local unit, remote unit, or both.

Configuring Alarm Thresholds

Alarm thresholds determine the level at which an alarm condition is reached. There are two types of HDSL alarm thresholds:

- Link ES threshold determines the number of errored seconds that must occur to trigger an alarm. This threshold can be set to 17 or 170 errored seconds. You can also disable this alarm.
- Margin threshold determines the margin, in dB, that triggers an alarm. This threshold can be set anywhere between 0 dB and 25 dB, in 1 dB increments. You can also disable this alarm.

To set the alarm thresholds:

- 1 From the **CURRENT ALARMS** display, press **Next** until **HDSL LINK ALARMS** displays.
- 2 Press **Enter** until the current HDSL alarm status displays.
- 3 Press **Next** until the **HDSL ES THRESHLD** displays.
- 4 Press **Enter**.
- 5 Press **Next** to scroll through the settings for the ES threshold until the desired setting displays.
- 6 Press **Enter** to select the desired setting. **HDSL ES THRESHLD** displays.
- 7 Press **Next** until **MARGIN THRESHLD** displays.
- 8 Press **Enter**.
- 9 Press **Next** to scroll through the settings for the margin threshold until the desired setting displays.
- 10 Press **Enter** to select the desired setting. **MARGIN THRESHLD** displays.

Viewing 24-Hour HDSL Alarm History

You can view the number of HDSL alarm conditions that have occurred over the past 24 hours. The LCD displays 24-hour information for the following alarms:

- local errored seconds (LOCAL ES)
- remote errored seconds (REMOTE ES)
- local unavailable seconds (LOCAL UAS)
- remote unavailable seconds (REMOTE UAS)

You may also view the time when the counter was last cleared and clear the counter.

To view the HDSL alarm history:

- 1 Press **Escape** until CAMPUS RS I/F: FRAC displays.
- 2 Press **Next** until HDSL LINK CONFIG & STATUS displays, then press **Enter**.
- 3 Press **Next** five times. PERFORMANCE STATUS displays.
- 4 Press **Enter**, then press **Next** to scroll through the alarm history displays.
- 5 To reset the counter, press **Next** until Press ENTER to clear error cnts displays, then press **Enter**.

Local Alarms

Loss of Signal (LOS) alarms can occur on the local unit. This section describes how to view and configure this alarm.

Viewing Current Alarms

If the CURRENT ALARMS display indicates a local alarm, you can determine the alarm type:

- 1 From the CURRENT ALARMS display, press **Next** twice. LOCAL I/F ALARMS displays.
- 2 Press **Enter**. The current status of the local alarm displays.

Configuring the Alarm

There are two settings for the local Loss of Signal alarm:

- ENABLE enables the alarm
- DISABLE disables the alarm

To configure the local Loss of Signal alarm:

- 1 From the CURRENT ALARMS display, press **Next** until LOCAL I/F ALARMS displays, then press **Enter**. The current status of the local alarm displays.
- 2 Press **Next** until LOC LOSS OF SIG displays.
- 3 Press **Enter**.
- 4 Press **Next** to scroll through the settings for the alarm.
- 5 Press **Enter** to select the desired setting. LOC LOSS OF SIG displays.

Remote Alarms

Loss of Signal (LOS) alarms can occur on the remote unit. This section describes how to view and configure this alarm.

Viewing Current Alarms

If the CURRENT ALARMS display indicates a remote alarm, you can determine the alarm type:

- 1 From the CURRENT ALARMS display, press **Next** until RMT I/F ALARMS displays.
- 2 Press **Enter**. The current status of the remote alarm displays.

Configuring the Alarm

There are two settings for the remote Loss of Signal alarm:

- ENABLE enables the alarm
- DISABLE disables the alarm

To configure the remote Loss of Signal alarm:

- 1 From the CURRENT ALARMS display, press **Next** until RMT I/F ALARMS displays, then press **Enter**. The current status of the remote alarm displays.
- 2 Press **Next** until RMT LOSS OF SIG displays.
- 3 Press **Enter**.
- 4 Press **Next** to scroll through the settings for the alarm.
- 5 Press **Enter** to select the desired setting. RMT LOSS OF SIG displays.

CONFIGURING LOOPBACKS

Loopbacks provide a way to test the data communication path between the Campus unit, the remote unit, and the remote host equipment. The Campus-RS Fractional Interface Card supports four types of loopbacks:

- Local to Local Interface
- Remote to Local Interface
- Remote to Remote Interface
- Local to Remote Interface

See [Chapter 7, “Testing the System”](#) for a description of each of these loopbacks.

Once a loopback condition has been initiated, it remains in effect until cleared. You may also set a loopback timeout to clear the loopback automatically after a set period of time has elapsed.

You manage loopbacks through the **DIAGNOSTICS** menu:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DIAGNOSTICS** displays, then press **Enter**.
LOOPBACK MODE displays.

The Campus-RS Fractional Interface Card also supports V.54 loopbacks. To enable V.54 loopback support, see [“Enabling V.54 Loopback Support” on page 4-22](#).

The following sections describe how to initiate and clear loopbacks, and to set a loopback timeout.

Initiating a Loopback

To initiate a loopback condition:

- 1 From the **LOOPBACK MODE** display, press **Enter**.
- 2 Press **Next** to scroll through the loopback options until the desired loopback condition displays.
- 3 Press **Enter** to drop the HDSL link and initiate the loopback.
LOOPBACK MODE displays.

Clearing a Loopback

To clear a loopback condition:

- 1 From the LOOPBACK MODE display, press **Enter**.
- 2 Press **Next** to scroll through the loopback options until NONE displays.
- 3 Press **Enter** to clear the loopback. LOOPBACK MODE displays.

Setting the Loopback Timeout

The loopback timeout determines the amount of time before a loopback clears automatically. Choose between the following settings:

- 20 Minutes
- 60 Minutes
- 120 Minutes
- None (disables the loopback timeout)

To set a loopback timeout:

- 1 From the LOOPBACK MODE display, press **Next** until LOOPBACK TIMEOUT displays.
- 2 Press **Enter** to access the loopback timeout options.
- 3 Press **Next** to scroll through the options until the desired setting appears.



If you set the loopback timeout to None, loopbacks run until you clear them manually or turn the unit off.

- 4 Press **Enter** to select the option and return to the LPBK TIMEOUT display.

Enabling V.54 Loopback Support

This section describes how to enable V.54 loopback support. See “[V.54 Loopback Support](#)” on page 7-5 for information on using V.54 loopbacks. Choose between the following:

- **ENABLE** enables V.54 loopback support.
- **DISABLE** disables V.54 loopback support.

To enable V.54 loopback support:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Next** until **DATA PORT CONFIG & STATUS** displays, then press **Enter**. **RATE MULTIPLIER** displays.
- 3 Press **Next** until **V.54 LOOPBACKS** displays, then press **Enter**.
- 4 Press **Next** to scroll through the options until the desired setting appears, then press **Enter**. **V.54 LOOPBACKS** and the new setting display.

VIEWING SYSTEM INFORMATION

Through the LCD menu you can view the following product information (with the option name in parentheses):

- firmware version and PROM checksum (**S/W REV** and **S/W CKSUM**)
- hardware configuration number
- local unit ID (**LOCAL UNIT ID**)
- remote unit ID (**REMOTE UNIT ID**)
- remote interface card (**REMOTE I/F**)
- circuit ID (**CIRCUIT ID**)

You cannot change this information through the LCD. Use an ASCII terminal to set the local and remote unit IDs and the circuit ID. See [“Entering System Information” on page 5-25](#).

To view the system information:

- 1 Press **Escape** until **CAMPUS RS I/F: FRAC** displays.
- 2 Press **Enter** to view the local unit ID.
- 3 Press **Next** to scroll through the remaining options.

CONFIGURING WITH AN ASCII TERMINAL

5

You can use an ASCII terminal (or PC with terminal emulation software) to configure Campus-RS system options and generate system reports. The ASCII terminal connects to the console port on the Campus-RS Desktop Unit or on the Campus-RS Line Unit installed in the Campus-Star chassis.

This chapter describes how to use an ASCII terminal to set the individual configuration options. To use an ASCII terminal to view system performance and other status information, see [Chapter 6](#), “[View Information and Status](#).”

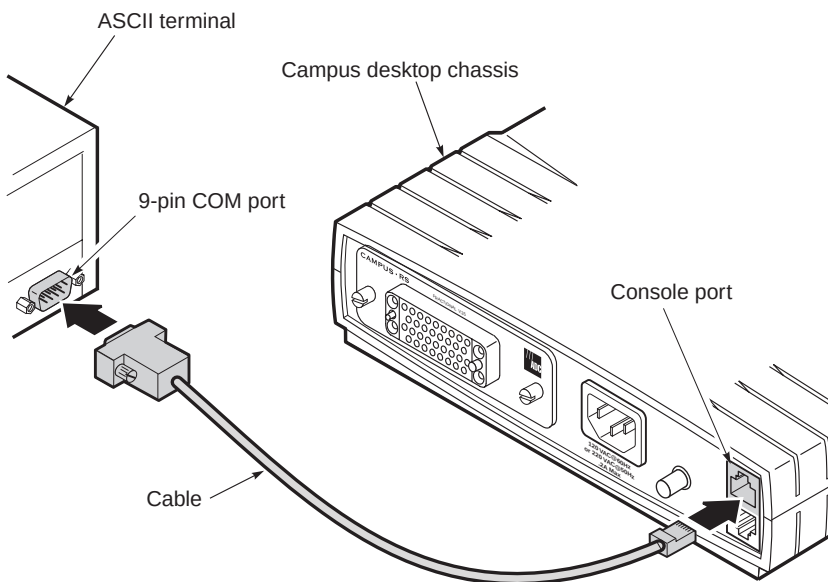
For Information About:	See Page
Connecting to an ASCII Terminal	5-2
Logging On and Off	5-4
Using the Terminal Menus	5-6
Returning Configuration Options to Default Values	5-7
Setting the HDSL Operating Mode	5-9
Configuring the Data Port	5-13
Configuring as a Master or Slave Unit	5-21
Configuring Alarms	5-23
Entering System Information	5-25
Configuring Loopbacks	5-28
Updating the Firmware	5-32

You can also set and view configuration option through the LCD and menu buttons on the front of the Campus-RS Desktop Unit or on the Campus Management Unit (CMU) on the Campus-Star chassis. To do this, see “[Configuring and Monitoring Through the LCD](#)” on page 4-1.

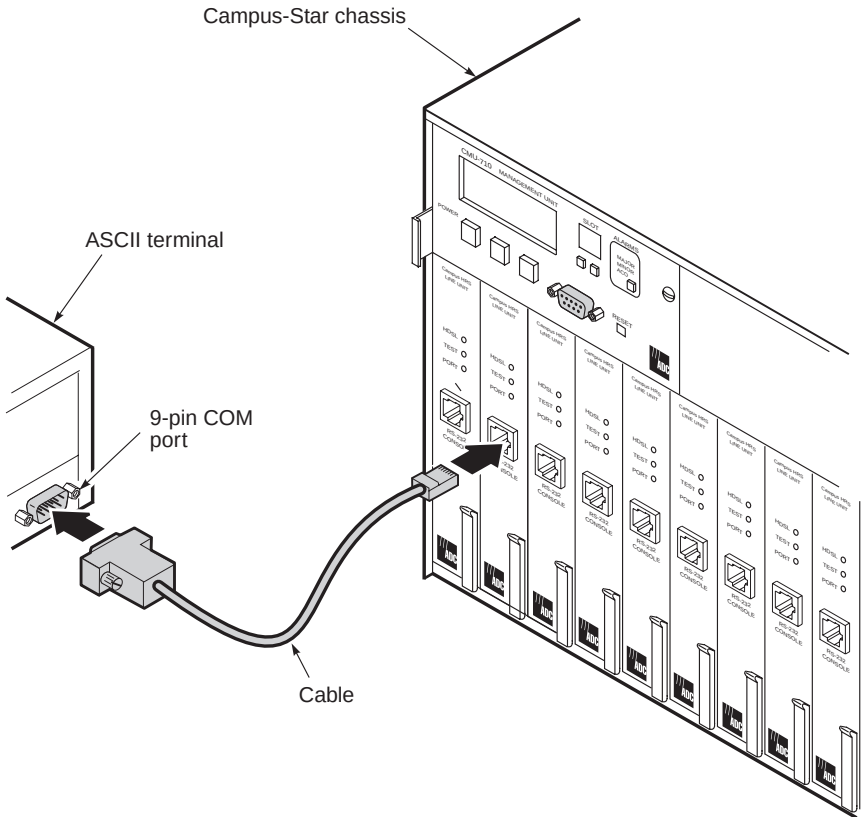
CONNECTING TO AN ASCII TERMINAL

To connect the Campus-RS Fractional Interface Card to an ASCII terminal:

- 1 Plug the console adapter into the standard 9-pin COM port on the ASCII terminal and tighten the attached screws until they are snug. Skip this step if the ASCII terminal provides an RJ48 jack.
- 2 Plug one end of the console cable into the console adapter, then do one of the following:
 - plug the other end of the console cable into the console port on the desktop unit.



- plug the other end of the console cable into the RS-232 port on the front of the line unit.



3 Configure the ASCII terminal to the following communications settings:

- 9600 baud
- no parity
- 8 data bits
- 1 stop bit
- no hardware flow control

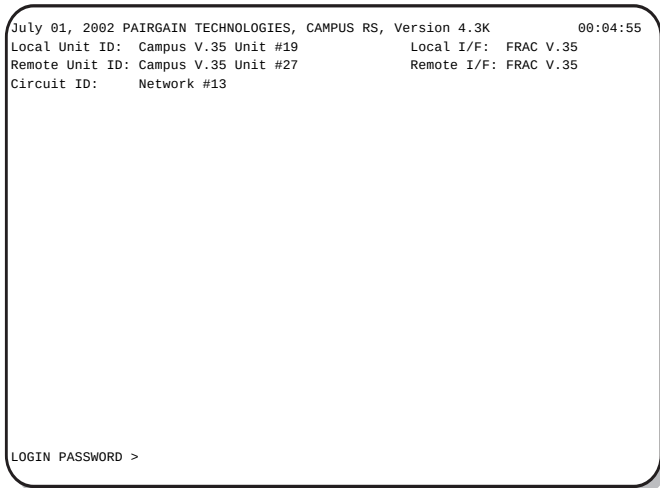
LOGGING ON AND OFF

Through the terminal menus, you can:

- log onto a local Campus Fractional system
- log onto a remote Campus Fractional system
- log off a Campus Fractional system
- log onto a remote Campus unit that is not a Campus Fractional unit (see the user manual for the interface card installed in the remote unit for configuration options)

Logging Onto a Local Campus Unit

- 1 Press the **SPACEBAR** on the ASCII terminal keyboard several times until the baud rate is established and the Logon Password screen displays on the terminal monitor.

A screenshot of an ASCII terminal window showing the Logon Password screen. The screen has a white background with black text. At the top, it displays system information: 'July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K' on the left and '00:04:55' on the right. Below this, there are four lines of status information: 'Local Unit ID: Campus V.35 Unit #19', 'Local I/F: FRAC V.35', 'Remote Unit ID: Campus V.35 Unit #27', and 'Remote I/F: FRAC V.35'. The fifth line shows 'Circuit ID: Network #13'. At the bottom left, the prompt 'LOGIN PASSWORD >' is displayed. The terminal window has a rounded rectangular border.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:04:55
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

LOGIN PASSWORD >
```

- 2 Press **ENTER** to log on. If you have changed the password, type your password then press **ENTER**. The Main Menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F:  FRAC V.35
Circuit ID: Network #13

                                MAIN MENU

1)  SYSTEM STATUS
2)  DATA PORT SETTINGS
3)  SYSTEM SETTINGS
4)  DIAGNOSTICS
5)  REMOTE LOGON

                                (L)ogout

ENTER CHOICE>
```

If the system does not respond when you attempt to log on, ensure that hardware flow control is turned off on the ASCII terminal.

Logging Onto a Remote Campus Unit

- 1 Press the **SPACEBAR** on the ASCII terminal keyboard several times until the baud rate is established and the Logon Password screen displays on the terminal monitor.
- 2 Press **ENTER** to log on. If you have changed the password, type your password then press **ENTER**. The Main Menu displays.
- 3 Press **5** then press **ENTER**.

The menu header changes to indicate the remote unit ID as the local unit, and local unit ID as the remote. Although the ASCII terminal is physically connected to the local unit, it acts as if it were connected to the remote unit. The prompt changes to REMOTE LOGON PASSWORD.

The screens and procedures on the Remote Main Menu are identical to those on the Local Main Menu, except the REMOTE LOGON option is unavailable.

Logging Off a Campus Unit

From the Main Menu, type **L** then press **ENTER** to log off the unit menus. If the Main Menu is not the current menu, press **R** then press **ENTER** until the Main Menu displays.

USING THE TERMINAL MENUS

Each screen identifies all the keys you can use on that screen. Several keys operate identically on all the menu screens:

- To access menu items, type the number of the item then press **ENTER**.
- Type **R** then press **ENTER** to exit the current menu and return to the previous one.
- In menus more than one level below the Main Menu, type **M** then press **ENTER** to return to the Main Menu.

There are two types of configuration options. One type lets you select the desired value from a list of predefined values. The other type prompts you to type in the required information.

To set an option from a list of predefined values:

- 1 Type the number of the option, then press **ENTER**. The option setting changes to the next value in the list and the screen redraws.
- 2 Repeat the first step until the option is set to the desired value.

To set an option that requires you to enter information:

- 1 Type the number of the option, then press **ENTER**. The screen prompts you for information.
- 2 Type the information, in the format requested, then press **ENTER**.

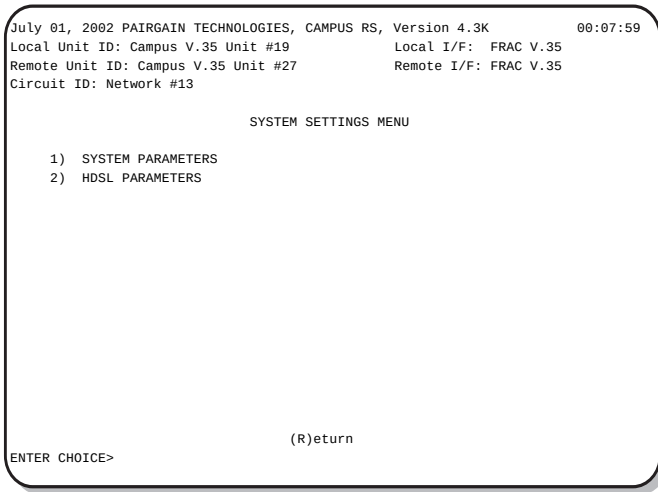
See [“ASCII Terminal Menu Reference” on page A-14](#) for a map of the terminal menu structure.

RETURNING CONFIGURATION OPTIONS TO DEFAULT VALUES

You can restore all of the configuration options to their factory default values. This is an easy way to remove undesired configurations you may have set and want to return to their default settings.

To restore the system:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

A terminal window screenshot showing the SYSTEM SETTINGS MENU. At the top, it displays system information: 'July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K' and a timestamp '00:07:59'. Below this, it shows 'Local Unit ID: Campus V.35 Unit #19', 'Local I/F: FRAC V.35', 'Remote Unit ID: Campus V.35 Unit #27', 'Remote I/F: FRAC V.35', and 'Circuit ID: Network #13'. The main title 'SYSTEM SETTINGS MENU' is centered. Below it, two options are listed: '1) SYSTEM PARAMETERS' and '2) HDLS PARAMETERS'. At the bottom, there is a '(R)eturn' option and a prompt 'ENTER CHOICE>'.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

                                SYSTEM SETTINGS MENU

1)  SYSTEM PARAMETERS
2)  HDLS PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The System Parameters menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F:  FRAC V.35
Circuit ID: Network #13

                        SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDSL ES Alarm Threshold:      Disabled      (Disabled, 17, 170)
7) HDSL Margin Alarm Threshold:  Disabled
8) Local Data Port LOS Alarm:    Disabled      (Disabled, Enabled)
9) Remote Data Port LOS Alarm:   Disabled      (Disabled, Enabled)

10) RESET TO FACTORY DEFAULT

                        (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 3 Type **1 0** then press **ENTER**.

The system restores the configuration options to their default values and returns to the System Status menu.



The HDSL options must be the same for both the local and remote unit. Resetting the Campus unit configuration values on one unit only, may cause the HDSL link to go down.

SETTING THE HDSL OPERATING MODE

The Fractional Interface Card is set to operate in Standard Mode with a T1 (1.544 Mbps) HDSL Rate. This is compatible with other Campus-RS products and with Campus-T1 Desktop Units and Line Units.

To change the HDSL Operating Mode:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F:  FRAC V.35
Circuit ID: Network #13

                        SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **2** then press **ENTER**. The Standard Mode HDSL Parameters menu displays. If the Fractional Interface Card is set to an Extended HDSL Operating Mode, the Extended Mode HDSL Parameters menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

                STANDARD MODE HDSL PARAMETERS

1) HDSL OPERATING MODE: Standard      (Standard, Extended)
2) TRANSCEIVER MODE: Auto      (Master, Slave, Auto)
3) HDSL RATE: T1      (768, T1, E1)

Changes Will Not be Effective Until This Menu Is Exited!

                (R)eturn (M)ain Menu

ENTER CHOICE>
```

- 3 Continue with one of the following sections, depending on whether you are using one of the three standard HDSL modes (T1, E1, or 768), or an extended mode.

Selecting a Standard Mode

This section continues from [Step 3](#) in the previous section to set a Standard HDSL mode. Choose from the following settings:

- T1
- E1
- 768

To set the Standard Mode HDSL Rate:

- 1 If the terminal is set to the Extended Mode HDSL Parameters menu, type **1** then press **ENTER**. Otherwise, skip this step.
- 2 From the Standard Mode HDSL Parameters menu, type **3** then press **ENTER**. The HDSL Rate option changes to the next in the list of HDSL Rates.
- 3 Repeat the previous step until the HDSL Rate option is set to the desired setting.
- 4 Type **R** then press **ENTER** to save the new HDSL Rate to NVRAM and exit the HDSL Parameters menu.

Selecting an Extended Mode

This section continues from [Step 3 on page 5-10](#) to set an Extended HDSL mode.

To set an Extended Mode HDSL Rate, you must:

- Set the Extended Mode Loop Configuration to 1 Loop or 2 Loops, depending on the physical layout of your HDSL network.
- Set the Extended Mode HDSL Rate to one of the options determined by the Extended Mode Loop Configuration:
 - 1 Loop HDSL Rate settings are between 64 kbps and 2.304 Mbps, in 64 kbps increments
 - 2 Loop HDSL Rate settings are between 256 kbps and 4.608 Mbps, in 128 kbps increments



For the 2 Loop HDSL configuration, specific revisions of the Fractional Interface Card only support a top rate of 2.304 Mbps configuration. Contact ADC for additional information regarding the affected part numbers.

- 1 From the Standard Mode HDSL Parameters menu, type **1** then press **ENTER**. The HDSL Operating Mode options changes from Standard Mode to Extended Mode. If the terminal is already set to the Extended Mode HDSL Parameters menu, skip this step.

```
July 01, 2002  PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K          00:07:59
Local Unit ID: Campus V.35 Unit #19          Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27         Remote I/F:  FRAC V.35
Circuit ID: Network #13

                                EXTENDED MODE HDSL PARAMETERS

1) HDSL Operating Mode:  Extended          (Standard, Extended)
2) Transceiver Mode:    Slave              (Master, Slave, Auto)
3) HDSL Loop Mode:      2 Loops            (1 Loop, 2 Loops)*
4) HDSL Rate:           256

*Note:
  1 Loop  = single loop, full duplex
  2 Loops = two loops, full duplex

Changes will not be effective until this menu is exited!

                                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 2 To change the HDSL Loop Mode, type **3** then press **ENTER**. The HDSL Loop Mode changes to the next available setting.
- 3 Type **4** then press **ENTER**. The Select HDSL High Rate (if the HDSL Loop Mode is set to 1 Loop) or Select HDSL Low Rate (if the HDSL Loop Mode is set to 2 Loops) menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:59
Local Unit ID: Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F:  FRAC V.35
Circuit ID: Network #13

                                SELECT HDLSL HIGH RATE

Current HDLSL Rate:  256
Current Loop Mode:   2 Loops

1)  N/A                13) 1664 kbps      25) 3200 kbps
2)  256 kbps           14) 1792 kbps      26) 3328 kbps
3)  384 kbps           15) 1920 kbps      27) 3456 kbps
4)  512 kbps           16) 2048 kbps      28) 3584 kbps
5)  640 kbps           17) 2176 kbps      29) 3712 kbps
6)  768 kbps           18) 2304 kbps      30) 3840 kbps
7)  896 kbps           19) 2432 kbps      31) 3968 kbps
8)  1024 kbps          20) 2560 kbps      32) 4096 kbps
9)  1152 kbps          21) 2688 kbps      33) 4224 kbps
10) 1280 kbps          22) 2816 kbps      34) 4352 kbps
11) 1408 kbps          23) 2944 kbps      35) 4480 kbps
12) 1536 kbps          24) 3072 kbps      36) 4608 kbps

                                (R)return  (M)ain Menu

ENTER CHOICE>

```

- 4 Type the number for the desired HDLSL transmission rate then press **ENTER**. The terminal returns to the HDLSL Parameters menu and displays the new HDLSL Rate.

CONFIGURING THE DATA PORT

Set the following parameters through the Data Port Settings menu:

- Data Rate
- Timing Source
- Transmit Clock
- Clock and Data Signal Inversion
- Output Control Signals

From the Main Menu, type **2** then press **ENTER**. The Data Port Configuration Menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:33:29
Local Unit ID:                                     Local I/F:  FRAC V.35
Remote Unit ID: Inactive                               Remote I/F: Inactive
Circuit ID:

                                DATA PORT CONFIGURATION

1) Data Rate:                224 Kbps
2) Rate Multiplier:          56K          (64K, 56K)
3) Timing Source:            Internal      (Port, Int, HDSL)
4) Transmit Clock:           External     (External, Internal)
5) Invert Input Clock:        Off          (Off, On)
6) Invert Output TX Clock:    Off          (Off, On)
7) Invert Output RX Clock:    Off          (Off, On)
8) Invert Data:              Off          (On, Off)
9) CTS:                      STD          (STD, On, Off)
10) DSR:                     STD          (STD, On, Off)
11) RLSD:                    Off          (STD, On, Off)
12) LT:                      STD          (STD, On, Off)
13) V.54 Loopbacks:          Disabled     (Disabled, Enabled)

                                (R)eturn  (M)ain Menu

ENTER CHOICE>

```

The remainder of this section describes how to set the Data Port options.

Setting the Data Rate

The data rate determines the speed at which data passes through the data port. There are two steps to setting the data rate:

- setting the rate multiplier
- choosing from the list of available data rates, determined by the rate multiplier and the HDSL Rate

Set the Rate Multiplier

The Rate Multiplier determines the size of each data packet that is transmitted or received through the data port. It can be set to one of the following:

- 64 kbps
- 56 kbps

To set the Rate Multiplier:

- 1 From the Data Port Settings menu, type **2** then press **ENTER**. The Rate Multiplier option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired Rate Multiplier setting.



If you change the Rate Multiplier, the Data Port Rate changes automatically to reflect the new multiplier.

Choose the Data Rate



If the Fractional Interface Card is set to Extended HDSL Mode, the data rate is determined by the Loop Configuration, HDSL Rate and Rate Multiplier. You cannot set the Data Rate with the card in Extended HDSL Mode. See [“Setting the Data Rate” on page 4-4](#) for more information.

To set the Data Rate:

- 1 From the Data Port Settings menu, type **1** then press **ENTER**. The Data Rate menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:06:52
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

                                SELECT DATA PORT RATE

Current Port Rate: 1536

1) 64 kbps      11) 704 kbps      21) 1344 kbps
2) 128 kbps     12) 768 kbps      22) 1408 kbps
3) 192 kbps     13) 832 kbps      23) 1472 kbps
4) 256 kbps     14) 896 kbps      24) 1536 kbps
5) 320 kbps     15) 960 kbps      25) 1544 kbps
6) 384 kbps     16) 1024 kbps
7) 448 kbps     17) 1088 kbps
8) 512 kbps     18) 1152 kbps
9) 576 kbps     19) 1216 kbps
10) 640 kbps    20) 1280 kbps

                                (R)eturn (M)ain Menu
ENTER CHOICE>
  
```

This illustration shows the Data Rate menu for a Fractional Interface Card set to Standard Mode with a Standard Mode HDSL Rate of T1. If your Fractional Interface Card is set to a different HDSL Rate, the Data Rate menu will be different.

- 2 Type the number for the desired Data Rate then press **ENTER**. The terminal returns to the Data Port Settings menu and displays the new Data Rate.

Setting the Primary Timing Source

The primary timing source determines the timing for the entire HDSL system. Timing can come from one of three parts of the Campus system:

- Data Port receives timing through the host equipment connected to the data port.
- Internal receives timing from the internal oscillator of the Campus unit (default setting).
- HDSL receives timing over the HDSL line.

Either the local or remote unit must have the timing source set to HDSL. The other unit must be set to Data Port or Internal, depending on the system setup. See [“Timing Source” on page 8-1](#) for examples of timing configurations.

To set the Primary Timing Source:

- 1 From the Data Port Settings menu, type **3** then press **ENTER**. The Timing Source option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired Timing Source setting.

Setting the Transmit Clock

The Transmit Clock option determines how the SD signal is sampled if the Timing Source is set to Internal or HDSL. There are two settings:

- External SD is sampled based on the clock transitions on the TT input.
- Internal SD is sampled based on the clock transitions on the SCT output.

For complete information about the Transmit Clock option, see [“Transmit Clock” on page 8-4](#).

To set the Transmit Clock:

- 1 From the Data Port Settings menu, type **4** then press **ENTER**. The Transmit Clock option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired Transmit Clock setting.

Inverting the Transmit Clock

There may be circumstances in which it is either desirable or necessary to invert one or more of the TT, SCT, and SCR clocks. This could be true if the host equipment provides inverted clock signals, if the differential clock signals are switched in the data cable, or if there is excessive clock delay. The Fractional Interface Card allows you to invert any of these clock signals by changing the appropriate Invert Clock option.

For physical-layer protocols that have unbalanced (single-ended) clock signals, the Invert Clock option has the effect of simply inverting the clock signal. This appears as a 180° phase delay. For physical-layer protocols which have balanced (two-wire) clock signals, the Invert Clock option has the effect of switching the inverting and non-inverting contacts.

There are two settings for each Invert Clock option:

- OFF leaves the output clock in its normal, non-inverted, state.
- ON inverts the clock signal or, for the TT input, inverts the input signal internally.

To invert the input clock (TT):

- 1 From the Data Port Settings menu, type **5** then press **ENTER**. The Invert Input Clock option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired invert clock setting.

To invert the output transmit clock (SCT):

- 1 From the Data Port Settings menu, type **6** then press **ENTER**. The Invert Output TX Clock option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired invert clock setting.

To invert the output receive clock (SCR):

- 1 From the Data Port Settings menu, type **7** then press **ENTER**. The Invert Output RX Clock option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired invert clock setting.

Inverting Data Signals

The Fractional Interface Card allows you to invert the SD and RD signals. Some protocols, such as X.25, use this data inversion to satisfy the ones density requirement of T1 lines operating in AMI mode. Unless specifically required by a protocol, do not use data inversion.

There are two settings for the Data Inversion option:

- OFF leaves SD and RD signals in their normal, non-inverted, state.
- ON inverts the SD and RD signals.

To invert the SD and RD signals:

- 1 From the Data Port Settings menu, type **8** then press **ENTER**. The Invert Data option changes to the next available setting.
- 2 Repeat the previous step until the Data Port Settings menu displays the desired Invert Data setting.

Configuring Output Control Signals

The fractional interface cards provide four standard output control signals:

- RLSD (Receive Line Signal Detect)
- TM (Test Mode)
- DSR (Data Set Ready)
- CTS (Clear to Send)

The operation of each control signal depends upon the specific operating mode selected. Each control signal can be individually configured for one of three modes:

- ON forces the control signal to remain on permanently, regardless of any other control signal activity or changes in unit status.
- OFF forces the control signal to remain off permanently, regardless of any other control signal activity or changes in unit status.

- STD sets to signal according to the standard rules for control signal operation found in RS-449 and RS-530 interfaces, depending on the signal:
 - RLSD is on as long as the HDSL link is synchronized. If the HDSL link is not synchronized, then RLSD is off.
 - TM is on whenever a loopback function is active at either the local or remote unit. The TM signal is affected by both V.54 loopbacks and loopbacks that are initiated through the LCD or terminal menus.
 - DSR follows the state of the Data Terminal Ready (DTR) input signal. When the DTR input is turned on, the DSR output is turned on. When the DTR input is turned off, the DSR output is turned off. This type of operation is consistent with standard operation for non-switched communications equipment operating on a dedicated private channel, such as HDSL.
 - CTS follows the state of the Request to Send (RTS) input signal. When the RTS input is turned on, the CTS output is turned on. When the RTS input is turned off, the CTS output is turned off. This type of operation is consistent with standard operation for non-switched communications equipment operating on a dedicated private channel, such as HDSL.

To configure the control signal options to the desired settings:

- 1 From the Data Port Settings menu, do one of the following:

- for CTS type **9** then press **ENTER**
- for DSR type **1 0** then press **ENTER**
- for RLSD type **1 1** then press **ENTER**
- for TM type **1 2** then press **ENTER**

The selected control signal option changes to the next available setting.

- 2 Repeat the previous step until the Data Port Settings menu displays the desired control signal option settings.

CONFIGURING AS A MASTER OR SLAVE UNIT

The Transceiver Mode option determines the hierarchy of the two Campus units when attempting to establish an HDSL link. There are three settings:

- If a unit is set to Master, it initiates the HDSL link. The other Campus unit must be set to Slave or Auto.
- If a unit is set to Slave, it waits for the other Campus unit to initiate the HDSL link. The other unit must be set to Master or Auto.
- If a unit is set to Auto, it automatically switches between Master and Slave until an HDSL link is established. The setting of the other Campus unit is irrelevant. This is the default setting.



Unless you have a compelling reason for doing otherwise, ADC recommends leaving the Transceiver Mode option set to Auto.

To change the Transceiver Mode:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:28
Local Unit ID:Campus V.35 Unit #19      Local I/F:  FRAC V.35
Remote Unit ID:Campus V.35 Unit #27      Remote I/F:  FRAC V.35
Circuit ID:Network #13

                                SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
  
```

- 2 Type **2** then press **ENTER**. The Standard Mode HDSL Parameters menu or Extended Mode HDSL Parameters menu displays (the following illustration shows the Standard Mode HDSL Parameters menu).

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:28
Local Unit ID:Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID:Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:Network #13

                STANDARD MODE HDSL PARAMETERS

1) HDSL Operating Mode: Standard      (Standard, Extended)
2) Transceiver Mode:   Slave         (Master, Slave, Auto)
3) HDSL Rate:          T1             (768, T1, E1)

Changes will not be effective until this menu is exited!

                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 3 Type **2** then press **ENTER**. The Transceiver Mode option changes to the next available setting.
- 4 Repeat the previous step until the Standard Mode HDSL Parameters menu or Extended Mode HDSL Parameters menu displays the desired Transceiver Mode settings.

CONFIGURING ALARMS

You can configure four different alarm options:

- HDLSL ES Alarm Threshold determines the number of errored seconds that must occur to trigger an alarm.
- HDLSL Margin Alarm Threshold determines the margin, in dB, that triggers an alarm.
- Alarm on Local I/F LOS lets you enable or disable the local Loss of Signal alarm.
- Alarm on Remote I/F LOS lets you enable or disable the remote Loss of Signal alarm.

To configure the alarm options:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:28
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

                        SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDLSL PARAMETERS

                                (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The System Parameters menu displays.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:28
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

                                SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDSL ES Alarm Threshold:      Disabled      (Disabled, 17, 170)
7) HDSL Margin Alarm Threshold:  Disabled
8) Local Data Port LOS Alarm:    Disabled      (Disabled, Enabled)
9) Remote Data Port LOS Alarm:   Disabled      (Disabled, Enabled)

10) RESET TO FACTORY DEFAULT

                                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 3 To configure the HDSL ES Alarm Threshold, type **6** then press **ENTER**. The System Parameters menu shows the new HDSL ES Alarm Threshold setting. Repeat this step until the desired setting displays.
- 4 To configure the HDSL Margin Alarm Threshold, type **7** then press **ENTER**.
- 5 Type the desired margin threshold value, or **D** to disable then press **ENTER**. The System Parameters menu shows the new HDSL Margin Threshold setting. Repeat this step until the desired setting displays.
- 6 To enable or disable the local LOS alarm, type **8** then press **ENTER**. The System Parameters menu shows the new Alarm on Local I/F LOS setting. Repeat this step until the desired setting displays.
- 7 To enable or disable the remote LOS alarm, type **9** then press **ENTER**. The System Parameters menu shows the new Alarm on Remote I/F LOS setting. Repeat this step until the desired setting displays.

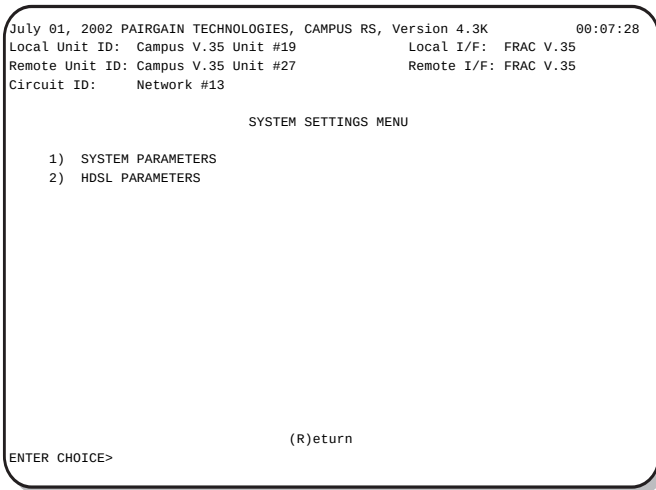
ENTERING SYSTEM INFORMATION

This section describes how to enter information about the system. This information is not required for system operation, but can assist in maintenance and troubleshooting tasks. Tasks described in this section are:

- setting the system time and date
- setting a password
- labeling the unit and circuit with unique identifiers

You perform all of these tasks from the System Parameters menu. To access this menu:

- 1 From the Main Menu, type **3** then press **ENTER**. The System Settings Menu displays.



```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:07:28
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

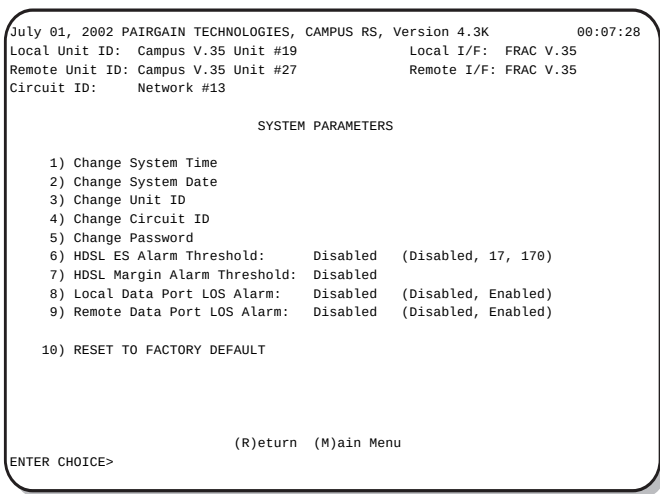
                        SYSTEM SETTINGS MENU

1) SYSTEM PARAMETERS
2) HDSL PARAMETERS

                        (R)eturn

ENTER CHOICE>
```

- 2 Type **1** then press **ENTER**. The System Parameters menu displays.



```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K          00:07:28
Local Unit ID: Campus V.35 Unit #19          Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27          Remote I/F: FRAC V.35
Circuit ID:      Network #13

                                SYSTEM PARAMETERS

1) Change System Time
2) Change System Date
3) Change Unit ID
4) Change Circuit ID
5) Change Password
6) HDLS ES Alarm Threshold:      Disabled      (Disabled, 17, 170)
7) HDLS Margin Alarm Threshold:  Disabled
8) Local Data Port LOS Alarm:    Disabled      (Disabled, Enabled)
9) Remote Data Port LOS Alarm:   Disabled      (Disabled, Enabled)

10) RESET TO FACTORY DEFAULT

                                (R)eturn  (M)ain Menu

ENTER CHOICE>
```

- 3 Continue with the following sections to set the desired options.

Setting the Time and Date

The Campus unit uses the time and date to record system events, such as alarms. To set the time and date:

- 1 From the System Parameters menu, type **1** then press **ENTER**. The system prompts you to enter the time.
- 2 Type the correct time, in *hh:mm* 24-hour format then press **ENTER**. The system displays the System Parameters menu with the correct time.
- 3 Type **2** then press **ENTER**. The system prompts you to enter the date.
- 4 Type the number of the day, the number of the month, and the four-digit year, separated by slashes (/) then press **ENTER**. The system displays the System Parameters menu with the correct date.

Setting a Password

A password prevents unauthorized access to Campus configuration options. Once a password has been set, it must be entered to log on to the system.

Your password can be any combination of up to ten letters or numbers, but the first character must be a letter. Passwords are case-sensitive.

To set a password:

- 1 From the System Parameters menu, type **5** then press **ENTER**. The system prompts you to enter the existing password.
- 2 If a password has already been set, type the password then press **ENTER**. If there is no password, just press **ENTER**. The system prompts you to enter the new password.

If you did not enter the correct password, the system prompts you to enter it again. If this happens, repeat the previous step.

- 3 Type the new password, up to ten characters, then press **ENTER**. The system prompts you to confirm the password.
- 4 Type the new password again then press **ENTER**. The system displays the System Parameters menu.

If you did not enter the correct password, the system prompts you to enter the new password again. Return to [Step 3](#).



If you forget your password and cannot log onto the Fractional Interface Card, use the LCD to restore the configuration settings to their default values. This removes the password. For more information, see “[Restoring the System to Default Values](#)” on page 4-4.

Identifying the Unit and Circuit

The Campus system supports two different identifiers:

- the Unit ID identifies the individual Campus unit
- the Circuit ID identifies the individual HDSL circuit, and is the same for both the local and remote units

To set or change these identifiers:

- 1 From the System Parameters menu, type **3** then press **ENTER**. The system prompts you to enter the Unit ID.
- 2 Type a unique identifier for the unit, up to 64 characters, then press **ENTER**. The system displays the System Parameters menu.
- 3 Type **4** then press **ENTER**. The system prompts you to enter the circuit ID.
- 4 Type a unique identifier for the circuit, up to 32 characters, then press **ENTER**. The system displays the System Parameters menu.

CONFIGURING LOOPBACKS

Loopbacks provide a way to test the data communication path between the Campus unit, the remote unit, and the remote host equipment. The Fractional Interface Card supports four types of loopbacks:

- Local to Local Interface
- Remote to Local Interface
- Remote to Remote Interface
- Local to Remote Interface

See [Chapter 7](#) for a description of each of these loopbacks.

Once a loopback condition has been initiated, it remains in effect until cleared. You may also set a loopback timeout to clear the loopback automatically after a set period of time has elapsed.

You manage loopbacks through the Loopback Settings menu:

- 1 From the Main Menu, type **3** then press **ENTER**. The Diagnostics menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:09:30
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

                                DIAGNOSTICS MENU

1) LOOPBACK SETTINGS MENU
2) DATA & CLOCK MONITOR
3) CONTROL SIGNALS MONITOR
4) DOWNLOAD MODE

                                (R)eturn

ENTER CHOICE>

```

- 2 Type **1** then press **ENTER**. The Loopback Settings menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:09:30
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

                                LOOPBACK SETTINGS

ACTIVE LOOPBACK: None

1) Local Data Port toward Local Data Port
2) Remote Data Port toward Local Data Port
3) Local Data Port toward Remote Data Port
4) Remote Data Port toward Remote Data Port
5) Terminate Loopbacks
6) Loopback Timeout (min): 20      (20, 60, 120, None)

WARNING: Any loopback will remove data link from service.

                                (R)eturn (M)ain Menu

ENTER CHOICE>

```

The Fractional Interface Card also supports V.54 loopbacks. To enable V.54 loopback support, see [“Enabling V.54 Loopback Support” on page 5-31](#).

The following sections describe how to initiate and clear loopbacks, and to set a loopback timeout.

Initiating a Loopback

To initiate a loopback condition type the number of the loopback you wish to initiate then press **ENTER**. The Loopback Settings menu displays the new loopback status.

Clearing a Loopback

To clear a loopback condition type **6** then press **ENTER**. The system disables the loopback. The Loopback Settings menu displays.

Setting the Loopback Timeout

The loopback timeout determines the amount of time before a loopback clears automatically. Choose one of the following:

- 20 minutes
- 60 minutes
- 120 minutes
- None (disables the loopback timeout)



If you set the loopback timeout to None, loopbacks run until you clear them manually or turn the unit off.

To set a loopback timeout type **7** then press **ENTER**. The Loopback Settings menu shows the new Loopback Timeout setting. Repeat this step until the desired setting displays.

Enabling V.54 Loopback Support

This section describes how to enable V.54 loopback support. See [“V.54 Loopback Support” on page 7-5](#) for information on using V.54 loopbacks. Choose between the following:

- Enable enables V.54 loopback support
- Disable disables V.54 loopback support

To enable V.54 loopback support:

- 1 From the Main Menu, type **2** then press **ENTER**. The Data Port Settings Menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K          00:06:35
Local Unit ID: Campus V.35 Unit #19          Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27          Remote I/F: FRAC V.35
Circuit ID: Network #13

                                DATA PORT CONFIGURATION

1) Data Rate:                    224 Kbps
2) Rate Multiplier:              56K          (64K, 56K)
3) Timing Source:                Internal      (Port, Int, HDSL)
4) Transmit Clock:              External      (External, Internal)
5) Invert Input Clock:          Off           (Off, On)
6) Invert Output TX Clock:      Off           (Off, On)
7) Invert Output RX Clock:      Off           (Off, On)
8) Invert Data:                 Off           (On, Off)
9) CTS:                         STD           (STD, On, Off)
10) DSR:                        STD           (STD, On, Off)
11) RLSD:                       Off           (STD, On, Off)
12) LT:                         STD           (STD, On, Off)
13) V.54 Loopbacks:             Disabled     (Disabled, Enabled)

                                (R)eturn (M)ain Menu

ENTER CHOICE>

```

- 2 Type **1 3** then press **ENTER**. The Data Port Settings menu displays the new V.54 Loopback setting.

UPDATING THE FIRMWARE

Firmware updates for the Fractional Interface Card are available through the ADC Web site. A password is required to download firmware updates. Contact your sales or service representative for a password, or call 800.370.9670, extension 2931.

To upgrade the firmware:

- 1 Use any Web browser to log onto the ADC Web site, www.adc.com.
- 2 Click Customer Site.
- 3 Click Firmware Updates to view a list of available firmware files.
- 4 Click Campus-RS Products to view a list of options.
- 5 Follow the instructions on the screen to download and install the updated firmware.

VIEW INFORMATION AND STATUS

6

This chapter describes how to use an ASCII terminal to view performance and product information. To use an ASCII terminal to configure system options, see [Chapter 5, “Configuring with an ASCII Terminal.”](#)

For Information About:	See Page
Monitoring HDSL Performance	6-2
Viewing Alarm History	6-6
Monitoring Clock and Data Signals	6-7
Monitoring Control Signals	6-8
Viewing Product Information	6-10

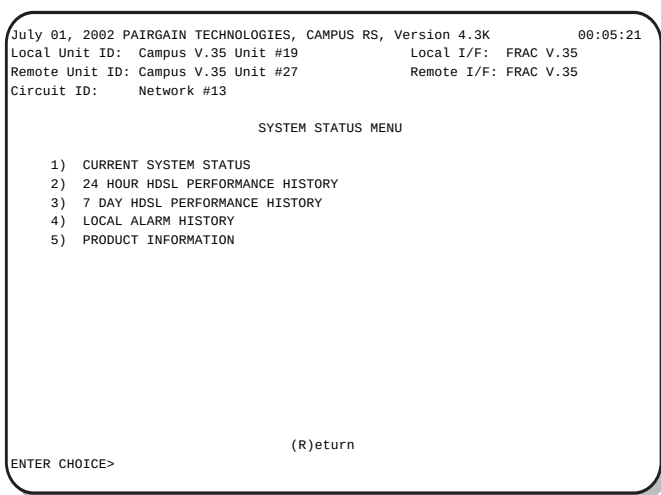
To view the information described in this chapter, you must first connect an ASCII terminal to the Campus-RS Desktop Unit or Campus-RS Line Unit with which the Fractional Interface Card is installed. Follow the instructions in [“Connecting to an ASCII Terminal” on page 5-2](#) to connect to a terminal.

You may also use the LCD menus to view the information described in this chapter. See [“Configuring and Monitoring Through the LCD” on page 4-1](#) for instructions on using the LCD panel.

MONITORING HDSL PERFORMANCE

The Current System Status menu provides a variety of information on the current performance of the Campus system. To open the Current System Status menu:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.



- 2 Type **1** then press **ENTER**. The Current System Status menu displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:05:30
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

      CURRENT SYSTEM STATUS
Local Alarms: HDSL-A, HDSL-B
Remote Alarms:
Loopback:

      HDSL-A              HDSL-B
      LOCAL      REMOTE      LOCAL      REMOTE
      -----
Margin (dB):      mn/cr/mx      mn/cr/mx      mn/cr/mx      mn/cr/mx
Pulse Attn (dB):  00           00           00           00
24 Hour ES:       00000       00000       00000       00000
24 Hour UAS:      02745       00000       02745       00000
Last Cleared:     None

-----
              (U)pdate (C)lear
              (R)eturn (M)ain Menu
ENTER CHOICE>

```

The Current System Status menu provides the following information:

- Local Alarms indicates the current local alarm status
- Remote Alarms indicates the current remote alarm status
- Loopback indicates the current loopback status
- Margin (db) indicates the minimum (mn), current (cr), and maximum (mx) HDSL margin value, measured in dB, relative to the signal-to-noise ratio required for a Bit Error Rate (BER) of 10^{-7}
- Pulse Attn (db) indicates the decrease in amplitude of the transmitted signal as measured at the HDSL receiver
- 24 Hour ES indicates the number of errored seconds over the last 24 hours
- 24 Hour UAS indicates the number of unavailable seconds over the last 24 hours
- Last Cleared indicates the date and time when the error counter was last cleared

The information on the Current System Status menu does not update automatically. To update this information, type **U** then press **ENTER**.

To clear the 24 Hour ES and 24 Hour UAS counters and reset the margin min and max values to the current value, type **C** then press **ENTER**.

The following sections describe how to monitor HDSL performance history.

24-Hour HDSL Performance History

To display HDSL information for the last 24 hours:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.
- 2 Type **2** then press **ENTER**. The 24 Hour HDSL Performance History screen displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      13:14:56
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

24 HOUR HDSL PERFORMANCE HISTORY

                                HDSL-A                                HDSL-B
                                LOCAL      REMOTE                        LOCAL      REMOTE
                                ES/UAS     ES/UAS                        ES/UAS     ES/UAS
                                -----     -----                        -----     -----
11:00      000/000      000/000      000/000      000/000
11:15      000/000      000/000      000/000      000/000
11:30      000/000      000/000      000/000      000/000
11:45      000/000      000/000      000/000      000/000
12:00      000/000      000/000      000/000      000/000
12:15      000/000      000/000      000/000      000/000
12:30      000/000      000/000      000/000      000/000
12:45      000/000      000/000      000/000      000/000
Current     000/000      000/000      000/000      000/000

(P)revious (N)ext (U)pdate
(R)return  (M)ain Menu

ENTER CHOICE>

```

To view more history information:

- To view the next page of the report, type **N** then press **ENTER**.
- To view the previous page, type **P** then press **ENTER**.

To update information on this screen, type **U** then press **ENTER**.



Performance history information is lost when power is removed from the Campus unit.

Seven-Day HDSL Performance History

To display HDSL information for the last seven days:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.
- 2 Type **3** then press **ENTER**. The 7 Day HDSL Performance History screen displays.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      13:15:13
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

7 DAY HDSL PERFORMANCE HISTORY

                                HDSL-A                                HDSL-B
                                LOCAL      REMOTE                        LOCAL      REMOTE
                                ES/UAS    ES/UAS                        ES/UAS    ES/UAS
                                -----    -----                        -----    -----
Jan 24      00000/00000    00000/00000    00000/00000    00000/00000
Jan 25      00000/00000    00000/00000    00000/00000    00000/00000
Jan 26      00000/00000    00000/00000    00000/00000    00000/00000
Jan 27      00000/00000    00000/00000    00000/00000    00000/00000
Jan 28      00000/00000    00000/00000    00000/00000    00000/00000
Jan 29      00000/00000    00000/00000    00000/00000    00000/00000
Jan 30      00000/00000    00000/00000    00000/00000    00000/00000
Jan 31*     00000/00000    00000/00000    00000/00000    00000/00000

*Since Midnight

                                (U)pdate
                                (R)eturn (M)ain Menu

ENTER CHOICE>

```

To update information on this screen, type **U** then press **ENTER**.

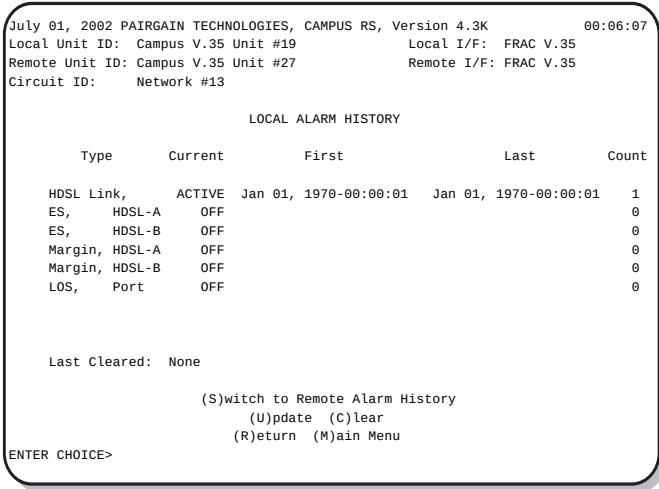


Performance history information is lost when power is removed from the Campus unit.

VIEWING ALARM HISTORY

To display alarm history information:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status Menu displays.
- 2 Type **4** then press **ENTER**. The Local Alarm History screen displays.



July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K 00:06:07
Local Unit ID: Campus V.35 Unit #19 Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27 Remote I/F: FRAC V.35
Circuit ID: Network #13

LOCAL ALARM HISTORY					
Type	Current	First	Last	Count	
HDSL Link,	ACTIVE	Jan 01, 1970-00:00:01	Jan 01, 1970-00:00:01	1	
ES, HDSL-A	OFF			0	
ES, HDSL-B	OFF			0	
Margin, HDSL-A	OFF			0	
Margin, HDSL-B	OFF			0	
LOS, Port	OFF			0	

Last Cleared: None

(S)witch to Remote Alarm History
(U)pdate (C)lear
(R)eturn (M)ain Menu

ENTER CHOICE>

This screen shows alarm history of the local unit. If the HDSL line uses two loops, the screen includes information for both loops. The screen includes information on the following alarms:

- Errored seconds (ES)
- Margin
- Loss of Signal (LOS)

To view remote alarm history, type **S** then press **ENTER**.

To update the information, type **U** then press **ENTER**.

To clear the information, type **C** then press **ENTER**.



Alarm history information is lost when power is removed from the Campus unit.

MONITORING CLOCK AND DATA SIGNALS

The Data and Clock Monitor provides the current status of the following data and clock control signals:

- SD (Send Data)
- TT (Terminal Timing)
- RD (Receive Data)
- ST (Serial Transmit)
- RT (Serial Receive)

The monitor shows each signal as active (*) or inactive (-). For more information about clock and data signals, see [Chapter 8](#).

- 1 From the Main Menu, type **4** then press **ENTER**. The Diagnostics menu displays.
- 2 Type **2** then press **ENTER**. The Data and Clock Monitor displays, adding a new status line every second.

```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:10:43
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID: Network #13

DATA & CLOCK MONITOR

Press ESC key to exit      */- = Activity/No Activity

TIME      TO DCE      FROM DCE
SD  SCTE      RD  SCT  SCR
00:10:44      -   -      *   *   *
00:10:45      -   -      *   *   *
00:10:46      -   -      *   *   *
00:10:47      -   -      *   *   *
00:10:48      -   -      *   *   *
00:10:49      -   -      *   *   *
00:10:50      -   -      *   *   *
00:10:51      -   -      *   *   *
00:10:52      -   -      *   *   *
00:10:53      -   -      *   *   *
00:10:54      -   -      *   *   *
00:10:55      -   -      *   *   *
```

- 3 Press **ESC** to close the Data and Clock Monitor and return to the Diagnostics menu.

MONITORING CONTROL SIGNALS

The Control Signals Monitor displays the current status of the following signals:

- RTS (Request to Send)
- DTR (Data Terminal Ready)
- LL (Local Loopback)
- RL (Remote Loopback)
- RLSD (Receive Line Signal Detect)
- LT (Loopback Test)
- DSR (Data Set Ready)
- CTS (Clear to Send)

- 1 From the Main Menu, type **4** then press **ENTER**. The Diagnostics menu displays.
- 2 Type **3** then press **ENTER**. The Control Signals Monitor displays, adding a new status line every second.

```

July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K          00:11:07
Local Unit ID: Campus V.35 Unit #19          Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27          Remote I/F: FRAC V.35
Circuit ID: Network #13

                                CONTROL SIGNALS MONITOR

Press ESC key to exit                                */- = ON/OFF

                                TO DCE
                                RTS  DTR  LL   RL
TIME
00:11:08          -   -   -   -
00:11:09          -   -   -   -
00:11:10          -   -   -   -
00:11:11          -   -   -   -
00:11:12          -   -   -   -
00:11:13          -   -   -   -
00:11:14          -   -   -   -
00:11:15          -   -   -   -
00:11:16          -   -   -   -
00:11:17          -   -   -   -
00:11:18          -   -   -   -
00:11:19          -   -   -   -

                                FROM DCE
                                CTS   DSR  RLSD  LT
00:11:08          -   -   *   -
00:11:09          -   -   *   -
00:11:10          -   -   *   -
00:11:11          -   -   *   -
00:11:12          -   -   *   -
00:11:13          -   -   *   -
00:11:14          -   -   *   -
00:11:15          -   -   *   -
00:11:16          -   -   *   -
00:11:17          -   -   *   -
00:11:18          -   -   *   -
00:11:19          -   -   *   -

```

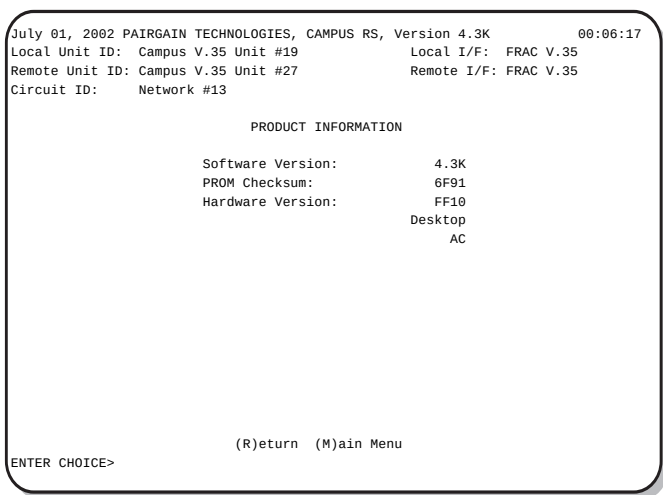
- 3 Press **ESC** to close the Control Signals Monitor and return to the Diagnostics menu.

The monitor shows each signal as on (*) or off (-). For more information about control signals, see [“Configuring Output Control Signals” on page 5-19](#).

VIEWING PRODUCT INFORMATION

The Product Information screen displays manufacturing information about the Fractional Interface Card. This information is important if you ever need to contact ADC for technical support. To open the Product Information screen:

- 1 From the Main Menu, type **1** then press **ENTER**. The System Status screen displays.
- 2 Type **5** then press **ENTER**. The Product Information screen displays.



```
July 01, 2002 PAIRGAIN TECHNOLOGIES, CAMPUS RS, Version 4.3K      00:06:17
Local Unit ID: Campus V.35 Unit #19      Local I/F: FRAC V.35
Remote Unit ID: Campus V.35 Unit #27      Remote I/F: FRAC V.35
Circuit ID:      Network #13

                        PRODUCT INFORMATION

Software Version:      4.3K
PROM Checksum:      6F91
Hardware Version:      FF10
                        Desktop
                        AC

                        (R)eturn (M)ain Menu

ENTER CHOICE>
```

The Product Information screen displays the following information:

- the version number of the Fractional Interface Card software (this also displays in the heading of all the terminal screens)
- the PROM checksum, a hexadecimal number used to verify unit PROMs
- the hardware version of the Campus-RS Desktop Unit or Line Unit.

TESTING THE SYSTEM

7

The Fractional Interface Card supports a complete set of loopback functions that allow you to test the data communication path between the host equipment, the Campus unit, and the remote unit. You can use the LCD and menu buttons or an ASCII terminal to initiate loopback tests.

To initiate a loopback from the LCD, see [“Configuring Loopbacks” on page 4-20](#). To use an ASCII terminal to initiate a loopback, see [“Configuring Loopbacks” on page 5-28](#).

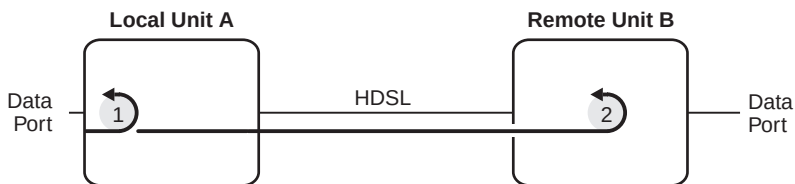
Initiating a loopback test interrupts normal system operation and the TEST LED on the desktop unit or line unit front panel flashes. When the loopback is cancelled, the system returns to normal operation automatically.

TYPES OF LOOPBACKS

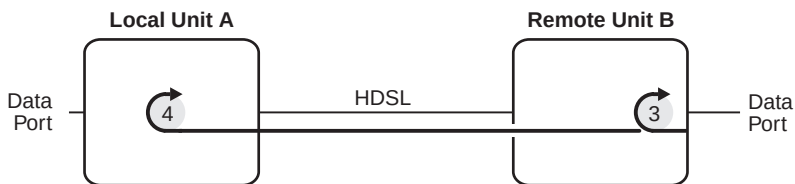
There are four loopback tests you can use with the Fractional Interface Card. Each tests a different portion of the communication path, which lets you isolate communication problems. For each test, the terms “local” and “remote” are relative to the Campus unit from which you initiate the loopback test. The Fractional Interface Card supports the following loopback tests:

- Local to Local Interface
- Remote to Local Interface
- Remote to Remote Interface
- Local to Remote Interface

The following figure shows the Local to Local (1) and Remote to Local (2) loopbacks.



The following figure shows the Remote to Remote (3) and Local to Remote (4) loopbacks.



The following sections describe each type of loopback.

Local to Local Loopback

The Local to Local loopback tests the local data port and a small portion of the Fractional Interface Card.

Use this loopback to verify that the local host equipment, local data cable, and local interface card are installed and configured properly. The remote host equipment is not involved in this type of loopback.

Remote to Local Interface

The Remote to Local loopback tests the local data port, the entire data path inside the local Campus unit, the HDSL line, the HDSL transceivers of both units, and most of the internal data path inside the remote unit.

Use this loopback to verify that the HDSL line is operational, and that the HDSL transceiver of the remote unit is operational. This loopback also tests the same areas as the Local to Local and Local HDSL loopbacks. The remote host equipment is not involved in this type of loopback.

Remote to Remote Interface

The Remote to Remote loopback tests the remote data port and a small portion of the remote Fractional Interface Card.

Use this loopback to verify that the remote host equipment, remote data cable, and remote interface card are installed and configured properly. The local host equipment is not involved in this type of loopback.

Local to Remote Interface

The Local to Remote loopback tests the remote data port, the entire data path inside the remote Campus unit, the HDSL line, the HDSL transceivers of both units, and most of the internal data path inside the local unit. This loopback does not test the local data port drivers and receivers.

Use this loopback to verify data communication from the remote host device to the internal data paths of the local Fractional Interface Card. The local host equipment is not involved in this type of loopback.

CANCELLING LOOPBACKS

There are two ways to cancel a loopback test:

- cancel the loopback manually
- set the Loopback Timeout option to cancel the loopback after a set period of time

Cancelling Loopbacks Manually

You can cancel a loopback from either the LCD or an ASCII terminal. To use the LCD, see [“Configuring Loopbacks” on page 4-20](#). See [“Configuring Loopbacks” on page 5-28](#) to use an ASCII terminal.

Loopback Timeout

When using a loopback, there is a possibility that it will be forgotten. If this happens, the communication link remains down. To prevent this from happening, you can set the Loopback Timeout configuration option. There are four different settings for this option:

- None
- 20 Minutes
- 60 Minutes
- 120 Minutes

This option determines how long a loopback remains active. When the Loopback Timeout option is set to one of the above values, the loopback is cancelled and normal communication is resumed after the set time has elapsed. If you set this option to None, the loopback remains in effect until you cancel it manually.

To set the Loopback Timeout through the LCD, see [“Setting the Loopback Timeout” on page 4-21](#). To use an ASCII terminal, refer to [“Setting the Loopback Timeout” on page 5-30](#).

V.54 Loopback Support

The Fractional Interface Card supports V.54-compliant loopbacks, which enable initiation of loopback tests from a V.54-capable host device. Before you can use V.54 loopbacks, you must enable V.54 loopback support. To enable V.54 loopback support through the LCD menu, see [“Enabling V.54 Loopback Support” on page 4-22](#). See [“Enabling V.54 Loopback Support” on page 5-31](#) to enable V.54 loopback support through an ASCII terminal.

The V.54 support function is implemented through the following control signals on the data port:

- **LL Signal (input):** When the LL (local loopback) input is activated by the host device, the Fractional Interface Card initiates a Local to Local loopback as described on [page 7-2](#). The Fractional Interface Card also turns on the TM output signal to provide confirmation of the loopback. The TM signal and Local to Local loopback remain active until the LL signal is turned off.
- **RL Signal (input):** When the RL (remote loopback) input is activated by the host device, the Fractional Interface Card initiates a Remote to Local loopback as described on [page 7-3](#). The Fractional Interface Card also turns on the TM output signal to provide confirmation of the loopback. The TM signal and Remote to Local loopback remain active until the RL signal is turned off.
- **TM Signal (output):** The TM (test mode) signal is activated by the Fractional Interface Card in response to activation of an LL or RL signal. The TM signal is also activated when any other loopback is initiated from the LCD, ASCII terminal, or V.54 control signals from the remote unit. The TM signal indicates to the local host device that a loopback test is active, regardless of how the test was initiated.

During normal operation, when no loopback is active, all three signals are off. When a V.54 loopback is in effect, the LL and RL input signals cannot be on at the same time. For example, when the RL signal is active, the LL signal is ignored.

TIMING AND CLOCK OVERVIEW

8

This chapter describes different issues in determining the correct settings for Campus-RS Fractional Interface Card clock and timing source options.

TIMING SOURCE

For normal operation, communications networks normally require that communicating elements be separated into data circuit-terminating equipment (DCE) and data terminal equipment (DTE). DCEs normally provide timing information for the DTEs.

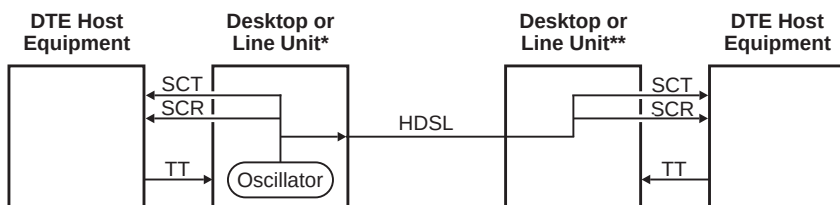
Campus-RS Fractional Interface Cards can operate in two basic network timing configurations:

- **Standard timing configuration:** The local and remote Fractional Interface Cards are both connected to DTE hosts.
- **Port timing configuration:** One of the Fractional Interface Cards (either the local or the remote) is connected to a DTE host, and the other is connected to a DCE host.

The Fractional Interface Cards are currently not capable of operating in a configuration where both hosts are DCE, and both Fractional Interface Cards are configured for port timing.

Standard Timing Configuration

In this configuration, the internal oscillator of one unit is used as a frequency reference for all clocks in the system. Since the Fractional Interface Cards are designed as DCE, they are expected to provide both Serial Clock Transmit (SCT) and Serial Clock Receive (SCR) output signals. Within a Campus system, set the Timing Source option for one of the Fractional Interface Cards to HDSL timing, as shown in the following figure. The connected host devices then use the SCT and SCR timing signals in order to derive transmit and receive timing for the Send Data (SD) and Receive Data (RD) signals.



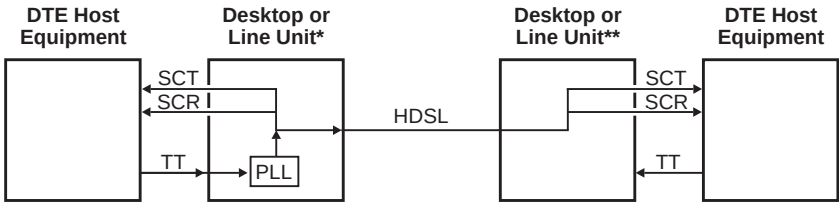
* Set to Internal Timing

** Set to HDSL Timing

The Terminal Timing (TT) signal shown in the figure above compensates for clock and data delays associated with long cables, or delays that may be inherent to the connected host equipment. Although it is highly recommended, the TT signal is optional in this timing configuration. If the TT signal is used, the host equipment must derive the TT signal from the SCT signal. This is discussed further in the “Transmit Clock” section of this manual.

Port Timing Configuration

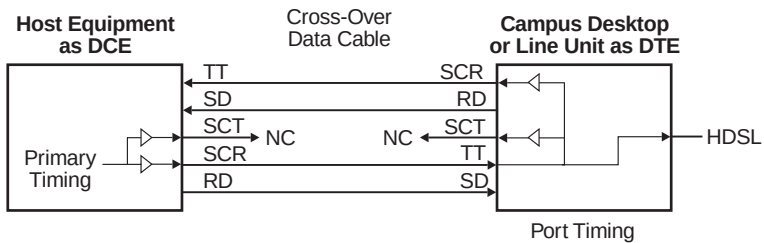
If one of the Fractional Interface Cards needs to accept primary timing from the connected host equipment, set its Timing Source option to Port timing. Set the Timing Source option for any connected Campus units to HDSL timing. The TT input of the “Port-timed” unit is used as a frequency reference for all clocks in the system, as shown in the figure below. A phase lock loop (PLL) keeps the Campus system in phase with the host timing. In this configuration, the TT input of the “Port-timed” unit serves a different purpose than in the figure on [page 8-2](#), and the Transmit Clock option becomes irrelevant. The TT input is used as a means of establishing the primary timing reference for both of the fractional interfaces and the HDSL link. Because the TT input is used to synchronize all clocks, excessive jitter and poor frequency stability at the TT input can cause degraded link performance.



* Set to Port Timing

** Set to HDSL Timing

The timing configuration shown in the figure above reverses the DTE/DCE role on one of the Fractional Interface Cards, forcing it to act as DTE instead of DCE. With this timing configuration, and with a DTE/DCE “cross-over” cable, you could connect one of the Fractional Interface Cards to a standard DCE host, as shown in the figure below.



The SCT signal on the Fractional Interface Cards cannot be configured as an input. Also, in a standard DCE host, the SCT signal is also an output. There are two critical implications for the configuration shown in the figure above:

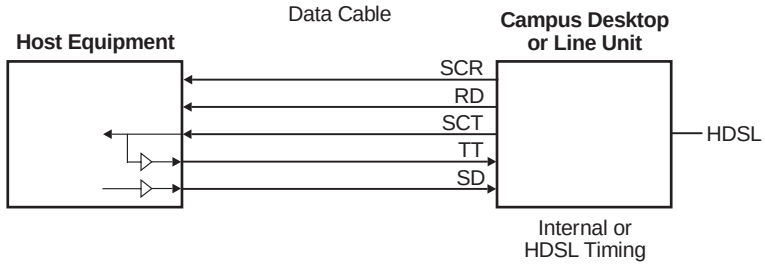
- The Fractional Interface Card accepts only one clock input (TT), this clock is assumed to provide a timing reference for both the transmit and receive data paths. The Fractional Interface Card uses the TT input to clock-in the SD input, and to clock-out the RD output. For proper operation, the DCE host must generate SCT and SCR from the same primary timing source. SCT and SCR can have a constant phase delay relative to each other, but they must be generated from the same timing source.
- Because the Fractional Interface Card synchronizes the RD output to the SCR clock output pin, the DCE host must be configured to sample the SD input based upon the TT clock input.

TRANSMIT CLOCK

Set the Transmit Clock option only if the Timing Source is set to either Internal or HDSL. When the Timing Source option is set to Port timing, the Transmit Clock option does not need to be set because TT is equivalent to SCT. The Transmit Clock option can be set to either External or Internal, and determines how the SD signal is sampled.

- **External:** The SD is sampled based upon the clock transitions on the TT input.
- **Internal:** The SD is sampled based upon the clock transitions on the SCT output.

One of the functions of the TT signal is to compensate for potential problems with clock and data delays associated with long cables, or delays that may be inherent to the connected host equipment. Potential delay problems exist when the SD signal arriving at the input of the Fractional Interface Card experiences phase delays relative to the SCT clock provided at the output of the Fractional Interface Card (shown in the figure below). This occurs when the data cable causes a significant delay on the SCT and SD signals, or when the host equipment delays the transmission of the SD signal, relative to the transitions on the received SCT signal, causing the SCT and SD signals to lose synchronization.



To circumvent this potential problem, set the Transmit Clock option on the Fractional Interface Card to External, so that the transmit clock is taken from the TT input instead of the SCT output. With this approach, the TT and SD signals experience the same delay as they propagate through the data cable, and remain synchronized to each other.

When the Timing Source is set to either Internal or HDSL, the SCT signal is used by the Fractional Interface Card to establish the frequency of the transmit data path. It does not necessarily indicate exactly where the transitions on SD should occur. SD typically has a constant phase delay from SCT. The TT signal, on the other hand, indicates the exact location of the binary transitions on SD. Any phase delay from the SCT output to the TT input must be constant. Furthermore, the TT signal cannot be from a different frequency source than SCT, and should not insert any jitter.

TECHNICAL REFERENCE A

This chapter includes reference information about the Campus-RS Fractional Interface Card.

For Information About:	See Page
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ASCII Terminal Menu Reference	A-14

DEFAULT SETTINGS

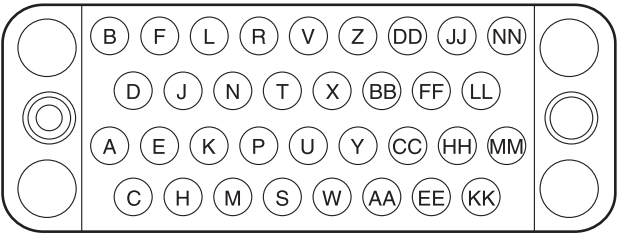
The following table lists default settings for Fractional Interface Card configuration options:

Parameter	Default
Data Port	
Data Rate	1536 kbps
Rate Multiplier	64K
Timing Source	Internal
Transmit Clock	External
Invert Input Clock	OFF
Invert Output TX Clock	OFF
Invert Output RX Clock	OFF
Invert Data	OFF
Control Signal Configuration	STD for all
V.54 Loopback Setting	Enabled
HDSL	
HDSL Mode	Standard
HDSL Rate	T1
XCVR Mode	Auto
Loopback Timeout	20 Minutes

PINOUTS

This section shows data port pinouts for each Fractional Interface Card. There are also pinouts for crossover cables for the V.35, RS-449, RS-530, and RS-530A ports.

V.35



V.35 Straight Cable Pinouts

Pin		Mnemonic	Description	Direction
A*	B†			
A		FG	Frame (Protective) Ground	Ground
B		SG	Signal Ground	Ground
	P S	SD	Send Data	To DCE
	R T	RD	Receive Data	From DCE
C		RTS	Request to Send	To DCE
D		CTS	Clear to Send	From DCE
E		DSR	Data Set Ready	From DCE
H		DTR	Data Terminal Ready	To DCE
F		RLSD	Received Line Signal Detector	From DCE
	U W	SCTE	Serial Clock Transmit Ext	To DCE
	Y AA	SCT	Serial Clock Transmit	From DCE
	V X	SCR	Serial Clock Receive	From DCE
L		LL	Local Loopback	To DCE
N		RL	Remote Loopback	To DCE
NN		LT	Test Mode	From DCE

* Pins provide a non-inverted signal.

† Pins provide an inverted signal.

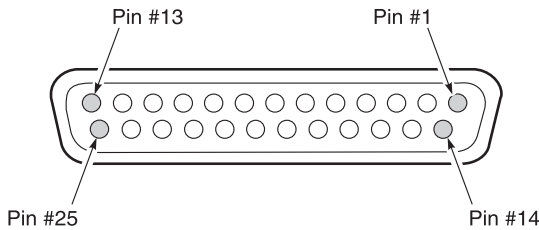


Connection pairs, circled in the table below, must be connected to twisted pairs in the cable. Failure to do this may result in data errors.

V.35 to V.35 DCE-DCE Crossover Cable

Mnemonic	Pin		Pin	Mnemonic
SCR-A	V		U	SCTE-A
SCR-B	X		W	SCTE-B
SCTE-A	U		V	SCR-A
SCTE-B	W		X	SCR-B
RD-A	R		P	SD-A
RD-B	T		S	SD-B
SD-A	P		R	RD-A
SD-B	S		T	RD-B
DSR	E		H	DTR
DTR	H		E	DSR
RTS	C		F	RLSD
RLSD	F		C	RTS
Frame Ground	A		A	Frame Ground
Shield Ground	B		B	Shield Ground

RS-449



RS-449 Straight Cable Pinouts

Pin		Mnemonic	Description	Direction
A*	B†			
1			Shield	Ground
19		SG	Signal Ground	Ground
37		SC	Send Common	Ground
20		RC	Receive Common	Ground
4	22	SD	Send Data	To DCE
6	24	RD	Receive Data	From DCE
7	25	RS	Request to Send	To DCE
9	27	CS	Clear to Send	From DCE
11	29	DM	Data Mode	From DCE
12	30	TR	Terminal Ready	To DCE
13	31	RR	Receiver Ready	From DCE
17	35	TT	Terminal Timing	To DCE
5	23	ST	Send Timing	From DCE
8	26	RT	Receive Timing	From DCE
10		LL	Local Loopback	To DCE
14		RL	Remote Loopback	To DCE
18		TM	Test Mode	From DCE

* Pins provide a non-inverted signal.

† Pins provide an inverted signal.

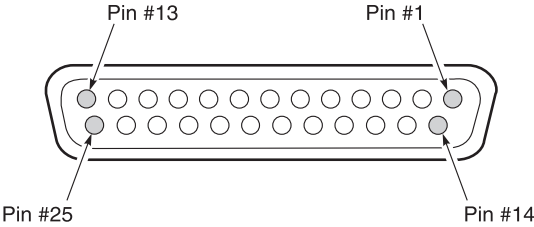


Connection pairs, circled in the table below, must be connected to twisted pairs in the cable. Failure to do this may result in data errors.

RS-449 to RS-449 DCE-DCE Crossover Cable

Mnemonic	Pin		Pin	Mnemonic
RT+	8		17	TT+
RT-	26		35	TT-
TT+	17		8	RT+
TT-	35		26	RT-
RD+	6		4	SD+
RD-	24		22	SD-
SD+	4		6	RD+
SD-	22		24	RD-
DM+	11		12	TR+
DM-	29		30	TR-
TR+	12		11	DM+
TR-	30		29	DM-
RS+	7		13	RR+
RS-	25		31	RR-
RR+	13		7	RS+
RR-	31		25	RS-
Ground	19		19	Ground

RS-530



RS-530 Straight Cable Pinouts

Pin		Mnemonic	Description	Direction
A*	B†			
1			Shield	Ground
7		AB	Signal Ground	Ground
2	14	BA	Transmitted Data	To DCE
3	16	BB	Receive Data	From DCE
4	19	CA	Request to Send	To DCE
5	13	CB	Clear to Send	From DCE
6	22	CC	DCE Ready	From DCE
20	23	CD	DTE Ready	To DCE
8	10	CF	Received Line Signal Detector	From DCE
24	11	DA	Transmitter Signal Element Timing (DTE)	To DCE
15	12	DB	Transmitter Signal Element Timing (DCE)	From DCE
17	9	DD	Receiver Signal Element Timing (DCE)	From DCE
18		LL	Local Loopback	To DCE
21		RL	Remote Loopback	To DCE
25		TM	Test Mode	From DCE

* Pins provide a non-inverted signal.

† Pins provide an inverted signal.

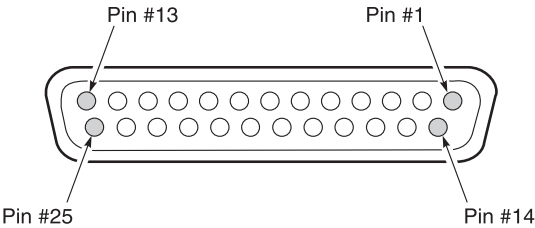


Connection pairs, circled in the table below, must be connected to twisted pairs in the cable. Failure to do this may result in data errors.

RS-530 to RS-530 DCE-DCE Crossover Cable

Mnemonic	Pin		Pin	Mnemonic
RT+ (DD)	17		24	TT+ (DA)
RT-	9		11	TT-
TT+ (DA)	24		17	RT+ (DD)
TT-	11		9	RT-
RD+ (BB)	3		2	SD+ (BA)
RD-	16		14	SD-
SD+ (BA)	2		3	RD+ (BB)
SD-	14		16	RD-
DM+ (CC)	6		20	TR+ (CD)
DM-	22		23	TR-
TR+ (CD)	20		6	DM+ (CC)
TR-	23		22	DM-
RS+ (CA)	4		8	RR+ (CF)
RS-	19		10	RR-
RR+ (CF)	8		4	RS+ (CA)
RR-	10		19	RS-
Ground (AB)	7		7	Ground (AB)

RS-530A



RS-530A Straight Cable Pinouts

Pin		Mnemonic	Description	Direction
A*	B†			
1			Shield	Ground
7	23	AB	Signal Ground	Ground
2	14	BA	Transmitted Data	To DCE
3	16	BB	Receive Data	From DCE
4	19	CA	Request to Send	To DCE
5	13	CB	Clear to Send	From DCE
6		CC	DCE Ready	From DCE
20		CD	DTE Ready	To DCE
8	10	CF	Received Line Signal Detector	From DCE
24	11	DA	Transmitter Signal Element Timing (DTE)	To DCE
15	12	DB	Transmitter Signal Element Timing (DCE)	From DCE
17	9	DD	Receiver Signal Element Timing (DCE)	From DCE
18		LL	Local Loopback	To DCE
21		RL	Remote Loopback	To DCE
25		TM	Test Mode	From DCE

* Pins provide a non-inverted signal.
† Pins provide an inverted signal.

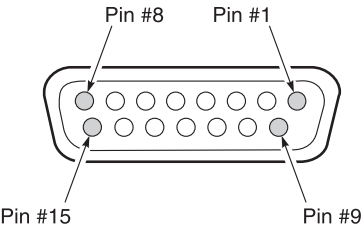


Connection pairs, circled in the table below, must be connected to twisted pairs in the cable. Failure to do this may result in data errors.

RS-530A to RS-530A DCE-DCE Crossover Cable

Mnemonic	Pin		Pin	Mnemonic
RT+ (DD)	17		24	TT+ (DA)
RT-	9		11	TT-
TT+ (DA)	24		17	RT+ (DD)
TT-	11		9	RT-
RD+ (BB)	3		2	SD+ (BA)
RD-	16		14	SD-
SD+ (BA)	2		3	RD+ (BB)
SD-	14		16	RD-
DM (CC)	6		20	TR (CD)
TR (CD)	20		6	DM (CC)
RS+ (CA)	4		8	RR+ (CF)
RS-	19		10	RR-
RR+ (CF)	8		4	RS+ (CA)
RR-	10		19	RS-
Ground (AB)	7		7	Ground (AB)

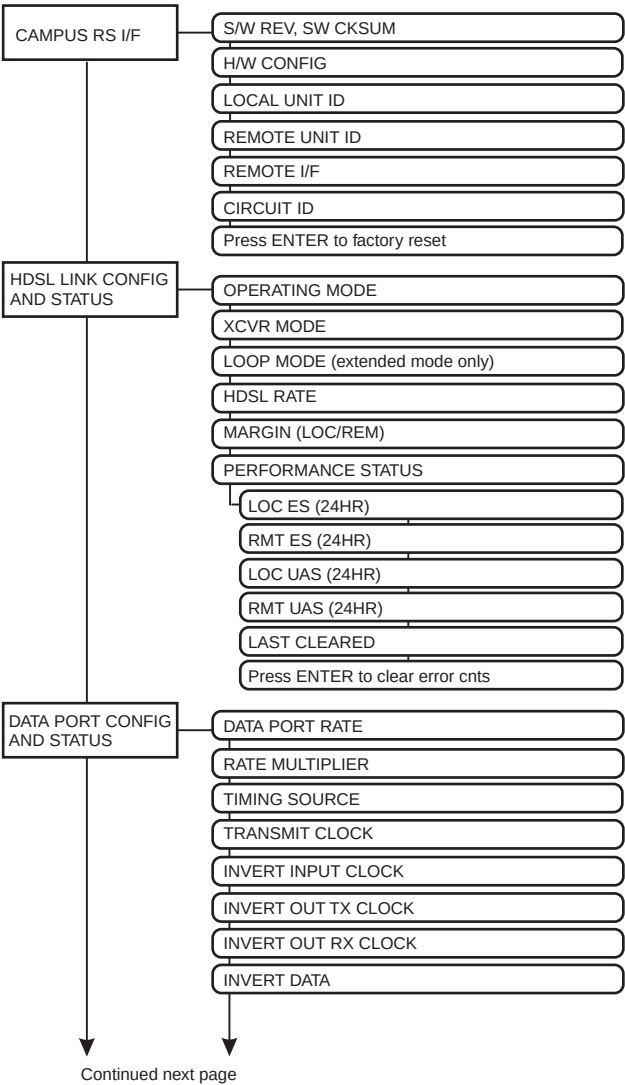
X.21



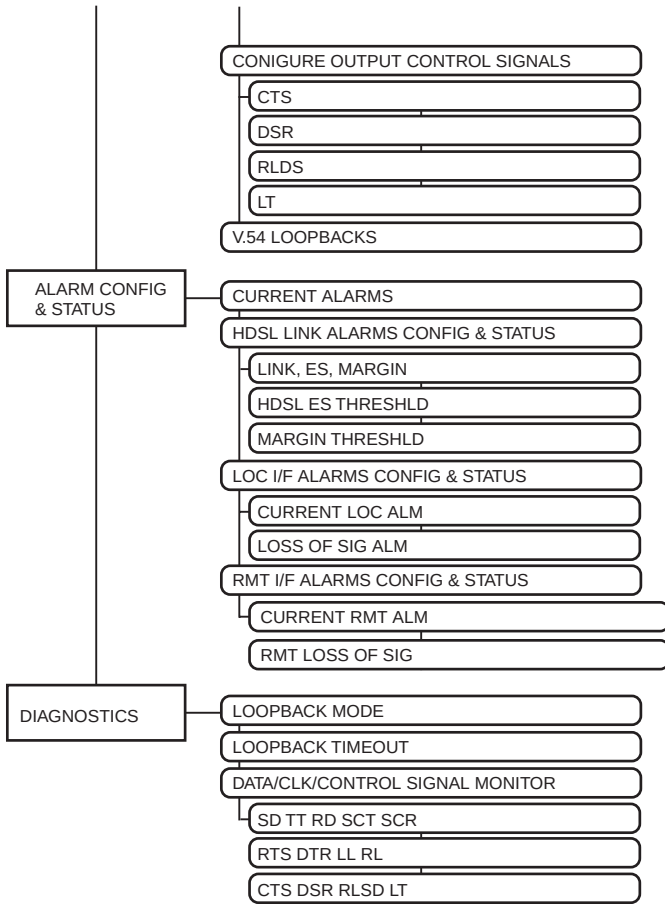
Pin		Mnemonic	Description	Direction
A*	B†			
8		SG	Signal Ground	Ground
1		FG	Frame Ground	Frame
2	9	SD	Send Data	To DCE
4	11	RD	Receive Data	From DCE
3	10	RS	Request to Send	To DCE
5	12	RR	Receiver Ready	From DCE
7	14	TT	Terminal Timing	To DCE
6	13	RT	Receive Timing	From DCE
* Pins provide a non-inverted signal.				
† Pins provide an inverted signal.				

LCD MENU REFERENCE

The illustration on the following pages diagrams the LCD menu structure.

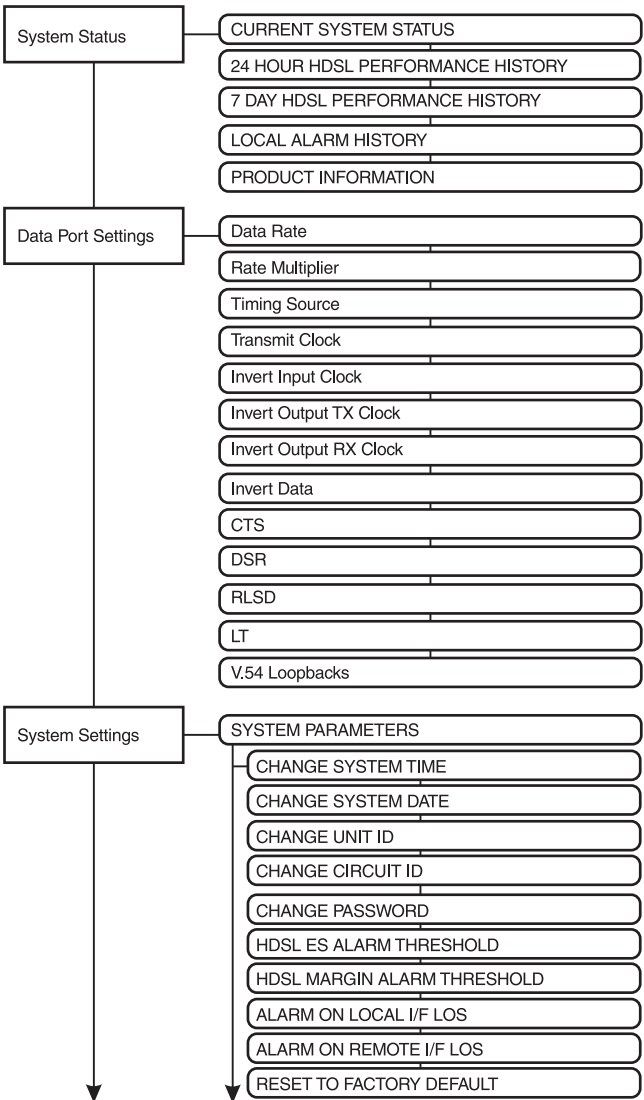


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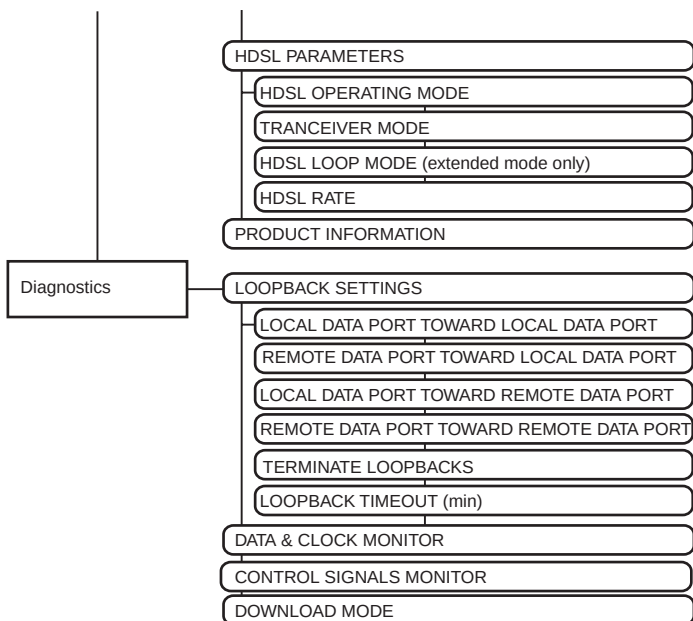
ASCII TERMINAL MENU REFERENCE

The illustration on the following pages shows the ASCII terminal menu structure for the Campus Fractional unit.



Continued next page

Continued from previous page



ABBREVIATIONS

B

2B1Q	2 Binary, 1 Quaternary
BER	Bit Error Rate
CMU	Campus Management Unit
CTS	Clear to Send
DCE	Data Circuit-Terminating Equipment
DSR	Data Set Ready
DSX-1	DS1 Cross-connect Frame
DTE	Data Terminal Equipment
DRT	Data Terminal Ready
ES	Errored Seconds
HDSL	High-bit-rate Digital Subscriber Lines
LOS	Loss of Signal
NVRAM	Non-volatile Random Access Memory
POTS	Plain Old Telephone Service
RD	Receive Data
RLSD	Receive Line Signal Detect
RS	Rate Selectable
RTS	Request to Send

SCR	Serial Clock Receive
SCT	Serial Clock Transmit
SD	Send Data
SNR	Signal-to-Noise Ratio
TT	Terminal Timing
UAS	Unavailable Seconds
UL	Underwriters Laboratory

DOCUMENTATION SET



This table describes all the manuals and guides in the Campus-RS documentation set.

Document	Description
<i>Campus-Star User Manual</i>	Contains instructions for setting up and using a Campus-Star. The manual includes instructions for installing Line Units and interface cards into the Campus-Star chassis.
<i>Campus-RS Line Unit User Manual</i>	Describes the features of the Campus-RS Line Unit and provides installation instructions.
<i>Campus-RS Desktop Unit User Manual</i>	Describes the features of the Campus-RS Desktop Unit and provides instructions for installing interface cards, and connecting the unit to an HDSL line.
Campus Interface Card User Manuals	Describes the features of the individual Campus interface cards, one card per manual, and contains instructions for configuring and monitoring the system through the cards.

PRODUCT SUPPORT



ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products. Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC).

Sales Assistance

800.366.3891 extension 73000
(USA and Canada)
952.917.3000
Fax: 952.917.3237

- Quotation Proposals
- Ordering and Delivery
- General Product Information

Systems Integration

800.366.3891, extension 73000
(USA and Canada)
952.917.3000

- Complete Solutions (from concept to installation)
- Network Design and Integration Testing
- System Turn-Up and Testing
- Network Monitoring (upstream or downstream)
- Power Monitoring and Remote Surveillance
- Service/Maintenance Agreements
- Systems Operation

ADC Technical Assistance Center

800.638.0031
714.730.3222
Fax: 714.730.2400
Email: wsd_support@adc.com

- Technical Information
- System/Network Configuration
- Product Specification and Application
- Training (product-specific)
- Installation and Operation Assistance
- Troubleshooting and Repair/Field Assistance

Online Technical Support

- www.adc.com/Knowledge_Base/index.jsp

Online Technical Publications

- www.adc.com/library1/

Product Return Department

800.366.3891 ext. 73748 or
952.917.3748

Fax: 952.917.3237

Email: repair&return@adc.com

- ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

All telephone numbers with an 800 prefix are toll-free in the USA and Canada.

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CERTIFICATION AND WARRANTY

FCC COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

LIMITED WARRANTY

Product warranty is determined by your service agreement. Contact your sales representative or Customer Service for details.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

SAFETY STANDARDS COMPLIANCE

This equipment has been tested and verified to comply with the applicable sections of the following safety standards.

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

For technical assistance, refer to [“Product Support” on page D-1.](#)

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Tel: 714.730.3222

Fax: 714.730.2400



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